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TUOLUMNE

WILD & SCENIC RIVER STUDY and ENVIRONMENTAL IMPACT STATEMENT

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DRAFT ENVIRONMENTAL IMPACT STATEMENT

05-16-78-09

Tuolumne River Wild and Scenic River Study

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San Francisco, California 94111

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Abstract:

This draft Environmental Impact Statement describes and analyzes the impacts of five alternatives, four of which provide for the possible inclusion of differing portions of the Tuolumne River into the National Wild and Scenic Rivers System.

Comments regarding this Environmental Statement should be sent to the Forest Supervisor, Stanislaus National Forest, 19777 Greenley Road, Sonora, California 95370.

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Date of Transmission to Environmental Protection Agency and Public:

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Summary

I. This study considers the potential designation of certain segments of the Tuolumne River in California as units of the National Wild and Scenic Rivers System, as provided by the Wild Scenic Rivers Act (Public Law 90-542). A 92-mile portion of the river, located entirely within Tuolumne County, California, was identified for study as a possible candidate for wild and scenic designation by an amendment (Public Law 93-621) to this Act.

Several segments of the study river possessing outstanding river values were found eligible for designation. A 62-mile portion of the river, including an ineligible 8-mile reservoir, within Yosemite National Park is managed much as it would be under wild and scenic river designation. The remaining 30-mile portion on Forest Service and Bureau of Land Management lands, including an ineligible 1-mile segment on Forest Service lands, offers potential for a variety of future uses.

II. The Alternatives:

Alternative A - Designation of all eligible river segments of the Tuolumne River - 83 miles.

Alternative B - Designation of those eligible segments above Early Intake - 60 miles.

Alternative C - Designation of all eligible river segments except a 2-mile segment below Early Intake and a 1-mile segment at the confluence with the Clavey River - 80 miles.

Alternative D - Designation of those eligible segments above the confluence with the Clavey River - 73 miles.

Alternative E - No designation (No Action).

Following the review of this draft report and environmental impact statement, the comments received will be analyzed and a final report and environmental impact statement prepared reflecting those comments. These documents will be submitted to the President by the Secretaries of Agriculture and the Interior. The President will report to Congress his recommendations with respect to the potential designation of portions of the Tuolumne River as a component of the National Wild and Scenic Rivers System.

Information in this draft report has been arranged and organized to facilitate review and comparison of the 5 alternatives presented. The Final Regulations of November 29, 1978, for the National Environmental Policy Act of 1969 (Public Law 91-190 as amended) indicate that alternatives including a proposed action

should be presented in environmental impact statements. Likewise the Water Resources Council's Principles and Standards of September 10, 1973, page 107, require that "An explicit presentation will be shown of the comparisons and resulting tradeoffs of the recommended plan to other alternative plans considered for recommendation."

Because this is a draft report and draft environmental statement subject to review and comment no recommendation with respect to any one alternative is included. In order, however, to comply with the requirements of the National Environmental Policy Act and the Principles and Standards, one of the alternatives considered must be given preference for purposes of comparison. Alternative A has been selected as the preferred alternative for this purpose.

III. Environmental impacts vary among the alternatives. The alternatives range from preservation of the wild and scenic river values of all of the river segments eligible for designation to the National Wild and Scenic Rivers System to no action.

Alternatives B and D, in proposing designation of less mileage than Alternative A, do not preclude, by provisions of the Wild and Scenic Rivers Act the development of hydroelectric

resources. Alternative C proposes designation of less mileage than Alternative A. However, whether it is a viable alternative cannot be fully addressed until more information is available with respect to the potential hydroelectric development. If Alternative C were selected and implemented, it is likely, based on present data, that Jawbone Dam and Reservoir would be found to have a direct and adverse effect on the designated river and construction of those units would be precluded under the provisions of Section 7(a) of the Wild and Scenic Rivers Act. Impacts of such hydropower development would vary in certain downstream portions of the Tuolumne River but would adversely impact visual, cultural, biological and recreational resources. Alternative E proposes no designation of river under the Wild and Scenic Rivers Act and would not preclude hydropower development in reaches downstream from Yosemite National Park. Hydropower development could provide substantial economic and social benefits.

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I. INTRODUCTION

The Federal Government's recognition of the importance of the Nation's rivers goes back to the early days of the Republic. As a result of this recognition, Federal programs were developed in association with rivers as arteries of commerce, means of transportation, sources of water for irrigation, and means of generating power. The idea that Federal attention should also be given to those rivers that remain in a relatively natural state came much later. In 1960, the National Park Service, responding to the Select Committee on National Water Resources, recommended "certain streams be reserved in their free-flowing condition because their natural, scenic, scientific, esthetic and recreational values outweigh their value for water development and control purposes ...."

Congress ultimately responded to this and other similar recommendations with passage of the Wild and Scenic Rivers Act as Public Law 90-542 on October 2, 1968. With passage of the Act, it became national policy

> that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be preserved in

free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.

More importantly, the Act provided a means to implement this policy by establishing a National Wild and Scenic Rivers System. The Act also designated 8 rivers as the initial components of that system, identified 27 rivers for study as potential additions, and prescribed methods and standards by which additional rivers could be included in the future.

Public Law 93-621, enacted January 3, 1975, as an amendment to the Wild and Scenic Rivers Act, mandated that portions of the Tuolumne River, as well as segments of 28 other rivers, be evaluated for possible inclusion in the National Wild and Scenic Rivers System. The Tuolumne was to be studied from its origins in Yosemite National Park downstream

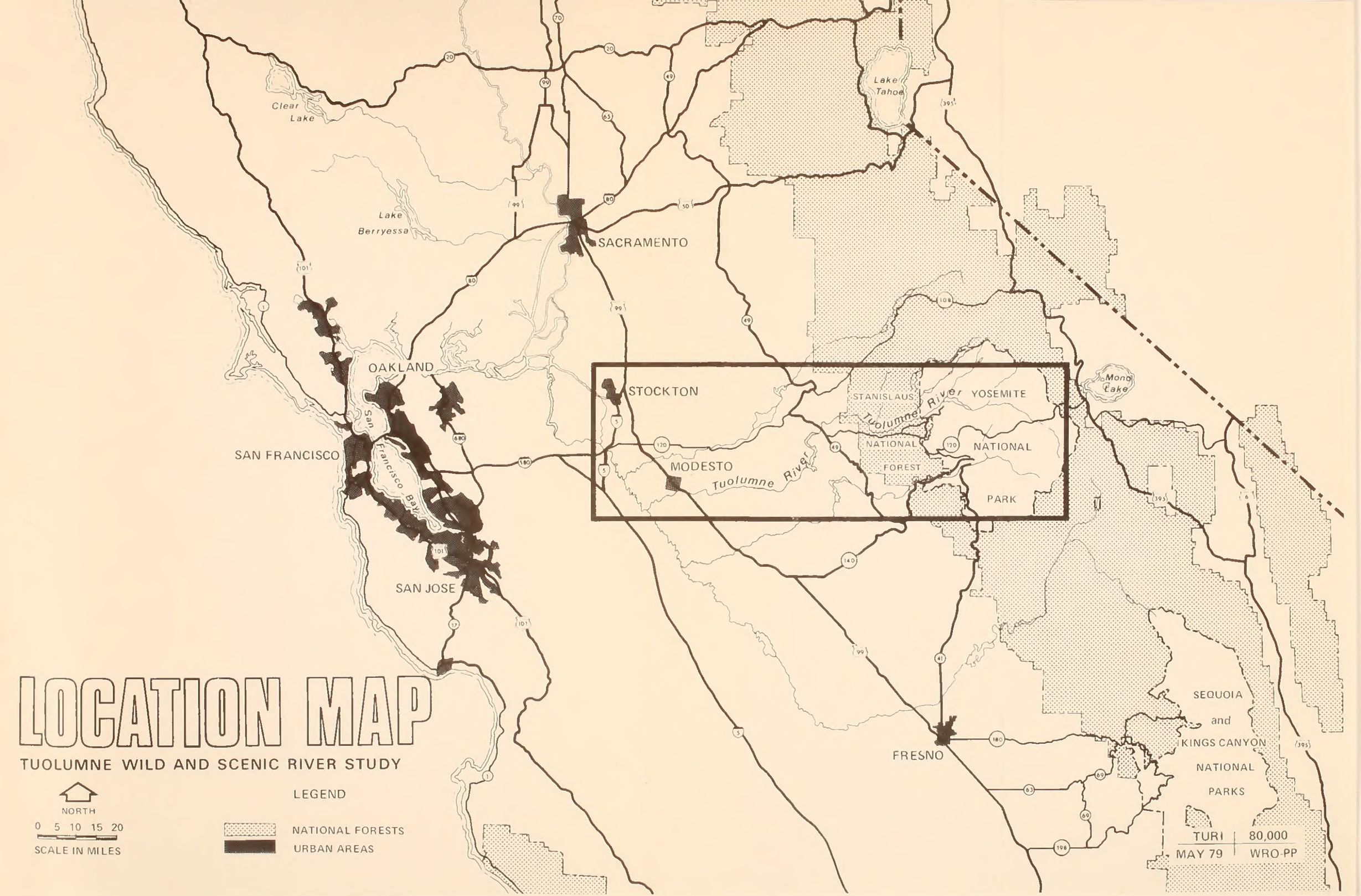
through the Stanislaus National Forest and public lands managed by the Bureau of Land Management to the headwaters of the Don Pedro Reservoir, a total distance of 92 miles.

The U.S. Forest Service of the Department of Agriculture and the National Park Service of the Department of the Interior, managers of most of the study river, have joint leadership responsibilities for the study and, in conjunction with the Heritage Conservation and Recreation Service and the Bureau of Land Management, were directed to assess its outdoor recreation, environmental, historical, social, and economic values. This assessment was to be carried out in cooperation and consultation with appropriate Federal, State, and local government agencies and with private groups and individuals.

The Wild and Scenic Rivers Act, the principal study mandate and guide, requires the preparation of a report which identifies and evaluates characteristics which do or do not make the study river a worthy addition to the system. These characteristics are based on those values listed in Section 1 of the Act and on criteria developed by the Secretaries of the Interior and Agriculture in accord with the provisions in Section 2(b) of the Act.

The study report is also to contain an environmental analysis, as required by Section 102(2)(c) of the National Environmental Policy

Act (NEPA) of 1969. Finally, "Principles and Standards for Planning Water and Related Land Resources," published in 1973 by the Water Resources Council pursuant to Section 103 of the Water Resources Planning Act of 1965, must be adhered to in order to obtain accurate appraisal of what is to be gained and/or lost, socioeconomically and environmentally, if a river were to be included in the National system.


LOCATION MAP
TUOLUMNE WILD AND SCENIC RIVER STUDY
NORTH
0 5 10 15 20
SCALE IN MILES
LEGEND
NATIONAL FORESTS
URBAN AREAS
SACRAMENTO
OAKLAND
SAN FRANCISCO
San Francisco Bay
SAN JOSE
STOCKTON
MODESTO
Tuolumne River
FRESNO
Clear Lake
Lake Berryessa
Lake Tahoe
Mono Lake
STANISLAUS NATIONAL FOREST
YOSEMITE NATIONAL PARK
SEQUOIA and KINGS CANYON NATIONAL PARKS
TURI 80,000
MAY 79 WRO-PP

II. EXISTING ENVIRONMENT

The Tuolumne River is located in north central California about three to five hours' driving time from the nearly five million residents of the San Francisco Metropolitan Bay Area.

The Tuolumne River's orgins are high in the mountains of Yosemite National Park near Tioga Pass. The Tuolumne flows westward from its origins for a total distance of 158 miles to join the San Joaquin River, draining a total area of about 2,000 square miles. The 92-mile stretch under consideration for designation within the Wild and Scenic Rivers System passes through varied geologic and vegetative zones and retains much of its natural character. Resource values are many and range from those associated with a wild river environment to those associated with hydropower developments. In this section, the resources significant to the study river will be discussed.

Geology

The Tuolumne River is located on the western slope of the Sierra Nevada Range, an immense, tilted block of granite extending over 400 miles northwestward through eastern California. Varying in width from 40 to 80 miles, the Sierra Nevada is characterized by steep, jagged snow-capped peaks on the east and a series of ridges and river canyons which slope toward California's Central Valley on the west. Three periods of

glaciation have carved these canyons into U-shaped valleys at higher elevations in Yosemite National Park and have also contributed to the massive granite domes and hanging valleys unique to that area. Elsewhere there are the steep-walled V-shaped canyons formed by the rivers.

The Tuolumne has two principal sources: the Dana Fork on Mount Dana (13,053 feet) and the Lyell Fork at the base of the glacier on Mount Lyell (13,114 feet). After flowing through Tuolumne Meadows, the largest subalpine meadow in the Sierra Nevada, the river cascades through the Grand Canyon of the Tuolumne and enters Hetch Hetchy Valley, a glaciated canyon now submerged beneath Hetch Hetchy Reservoir. Below Hetch Hetchy, the Tuolumne enters the Stanislaus National Forest, and flows through glaciated valleys and canyons down to Early Intake. Below Early Intake, several tributaries join the Tuolumne, increasing river flows. One mile before the end of the study segment, the river leaves the national forest and flows through land managed by the Bureau of Land Management. It then flows into Don Pedro Reservoir.

Rock types of the upper Tuolumne River are chiefly granites; three major intrusive periods in the development of the Sierra have contributed several different granitic rocks ranging from almost black hornblende gabbro to nearly white alaskite. Some metamorphic remnants occur at higher elevations, notably the slate summit of Mt. Lyell and

MINERALS AND GEOLOGY
TUOLUMNE
WILD AND SCENIC RIVER STUDY
YOSEMITE NATIONAL PARK
STANISLAUS NATIONAL FOREST
TUOLUMNE CITY
B.L.M. LANDS
NORTH FORK
TUOLUMNE RIVER
Elev. 830
GROVELAND
BIG OAK FLAT
106
120
CLAVEY RIVER
CHERRY LAKE
LAKE ELEANOR
CREEK
ELEANOR
HETCH HETCHY RESERVOIR
Elev. 4050
O'SHAUGHNESSY DAM
CHERRY CREEK
TUOLUMNE RIVER
GRAND CANYON OF THE TUOLUMNE RIVER
MATHER
SOUTH FORK
TUOLUMNE RIVER
MONO COUNTY
TUOLUMNE COUNTY
Elev. 9945
Tioga Pass
Elev. 9301
TUOLUMNE MEADOWS
DANA FORK
LYELL FORK
LEGEND
QUATERNARY ALLUVIUM
SIERRA NEVADA GRANITIC ROCKS
CALAVERAS FORMATION
CALAVERAS LIMESTONE
MINE
NORTH
1 ¼ ½ 0 1 2 3 4 Miles
TURI 80,001
MAY 79 WRO-PP

Mt. Dana's limestone cap. Volcanic rocks occur in Tuolumne Meadows, and glacial deposits are found at Lumsden Campground in the Stanislaus National Forest and north of Early Intake. The predominant granites become gradually more weathered below the park-forest boundary down past Early Intake until, at the South Fork confluence, they give way to the metasedimentary rocks of the Calaveras formation. These schists and slates, interspersed with a few limestone bands, characterize the rocks of the lower Tuolumne. Gold occurs in this metamorphic belt.

Climate

Climate on the west slope of the Sierra Nevada varies greatly due primarily to elevation change and distance from the Pacific Ocean. Lower elevations experience cool winters with moderately heavy precipitation - mostly as rain - and hot, dry Mediterranean summers. At higher elevations, winter is longer and colder, generally with heavy snows; spring comes late, and summer is cool with frequent thundershowers. North-facing slopes above 6,000 feet accumulate a heavy snowpack which remains until June or July.

Soils

Soils of the Tuolumne River area above Early Intake are primarily derived from the underlying granitic bedrock. Topography is the most important factor in soil differentiation; and with the exception of valleys and meadows, most soils are glacial or residual in nature with

low organic content. Meadow and valley soils, however, are deep and rich in organic matter and support a wide variety of plant species.

River soils become more weathered as the river flows westward, and the combination of steep slopes and swift waters allows for little soil buildup. Below Early Intake, canyon slopes average 70 percent or more, and the metasedimentary soils are generally shallow and highly erosive. Except along canyon rims or in the few alluvial flats, these soils primarily support only grasses or chaparral. There are no prime farmland soils within the 92-mile river corridor.

Vegetation

From its headwaters at over 13,000 feet down to an elevation of about 800 feet at Don Pedro Reservoir, the Tuolumne River passes through five major vegetative communities: alpine, subalpine, red fir, mixed conifer, and chaparral/oak. Elevation differences between canyon bottom and rim, plus the influence of sunlight on predominately north- or south-facing slopes, cause some overlap between these communities, especially at the lower altitudes. In addition, riparian vegetation types are found in scattered and narrow strips directly adjacent to the river and its tributaries. Several plant species found along the Tuolumne River above Don Pedro Reservoir have been recommended by the Smithsonian for "threatened" status. They are the Whitney sedge (*Carex whitneyi*), fawn lily, (*Erythronium tuolumnese*), the Mariposa

parsnip (Louatium congdonii), the Southern mule ear clarkia (Clarkia austratis), and the Shaggy lupine (Lupiuus spectabilus). One plant species, the Red Hills soap root (Chlorgalum gravaliflorum) has been proposed by the U.S. Fish and Wildlife Service as an endangered species. The alpine zone occurs at the headwaters of the Tuolumne, above 10,500 feet, and is characterized by miniature plants only a few inches in height. The subalpine zone, from 8,000 to 10,500 feet, consists chiefly of lodgepole and whitebark pine and several shrub species.

Red fir, lodgepole pine, and quaking aspen characterize the red fir zone, which is found from 6,500 to 8,000 feet. The mixed conifer zone, evident along the river in the western portion of Yosemite National Park, includes ponderosa pine and sugar pine, incense cedar, white fir, several deciduous tree types, and numerous shrubs.

As the river cuts deeper into the canyons and leaves Yosemite National Park, soil and aspect plays a more dominant role in determining vegetation. North-facing slopes contain mixed conifer species as do the canyon rims, but in the canyon bottom and on south-facing slopes below 4,000 feet are found the chaparral/oak species of the Sierra foothills. Digger pine, canyon live oak, and blue oak are the major tree types, with chamise, manzanita, and ceanothus the characteristic chaparral shrubs. Annual grasses also occupy much of the south-facing slopes.

Riparian vegetation along the lower river consists of white alder, willow, bigleaf maple, shrubs, sedges, and rushes. Due to seasonal high water and numerous rock bluffs, the riparian zone is narrow - often only a few feet wide - and discontinuous and frequently overlaps with other plant community zones.

Wildlife

The Tuolumne River study area offers a diverse habitat for wildlife. It is relatively isolated with only minimal human access, has a year-long water flow, and contains several vegetative zones. Within the Stanislaus National Forest portion of the study area, 210 terrestrial vertebrates and many fishes are potentially present; within Yosemite National Park, most of these species, plus over 100 others, could occur along the river.

Most of the amphibians along the Tuolumne are found in or near riparian habitats, while reptiles are common throughout the area from river bottom to canyon rim. Elevation and habitat diversity account for an abundance of bird species throughout the year; over 200 species may be represented.

Mammalian life is also diverse and includes furbearers, predators, game, and nongame species. Black bears, bobcats, coyotes, badgers, and

racoons are all common; and mountain lions still roam the river above Early Intake. Two migratory deer herds winter along the lower portion of the Tuolumne.

Although dams, impoundments, and controlled flows serve as barriers to fish migration, the river has a significant variety of fish life. Several trout species inhabit the coldwater portion of the Tuolumne and are joined by bass, bluegill, and other fishes farther downstream. A few nongame species are also present.

Endangered, threatened, or rare animals may inhabit the study area. The southern bald eagle is frequently observed along the river canyon, especially during winter months; although no eyries have been discovered, good nesting sites are available. The prairie falcon, a threatened species, is occasionally seen along the river; and an unconfirmed sighting of a nesting osprey has been reported. The spotted owl, classified as a unique species, has been noted along tributaries of the Tuolumne. Within Yosemite National Park, wolverine, fisher, pinemartin, and Sierra red flox, all listed as threatened species, are found in or near the river area. Two rare and endangered terrestrial snail species reside in the study corridor: the Stearns snail, possibly a relic species, and the Tuolumne snail.

Air Quality

Limited air quality monitoring has been done in the Mountain County Air Basin of which the Tuolumne River is a part. The basin itself has little industry and moderate vehicle use, so that any significant levels of air pollution would have to come from sources outside the area. Air currents normally move from the valley into the Sierra by day.

Monitoring of air at Modesto, Stockton, and Merced, the closest valley cities, has shown oxident levels exceeding Federal standards. Ozone transported into the river area could thus possibly cause damage to plants sensitive to pollutants, but no studies have been carried out to determine if such damage has occurred. Vehicle emissions within the study area are unlikely to result in significant ozone levels, although heavily-travelled Tuolumne Meadows may be an exception.

Land Ownership and Use

The upper 62 miles of the Tuolumne River are within Yosemite National Park, where land use is oriented entirely towards preservation of natural resources and recreation. The only exceptions to this are Hetch Hetchy Reservoir and powerhouse, managed by the City and County of San Francisco for domestic water and hydroelectric power, and the

Tioga Pass highway, which crosses the river and parallels the Dana Fork for several miles. All other study corridor lands within the park receive only recreational use.

Of the remaining 30 miles of river within the study area, 29 miles are managed by the Forest Service and one mile by the Bureau of Land Management under multiple use management. Logging, grazing, mining, and various recreation uses are all permitted, although existing resource values and multiple-use management plans concerned with the protection of the watershed have placed limits on these activities.

No lands adjacent to the river are classified as commercial timber lands. Environmental constraints - in this case, steep slopes - have also limited domestic grazing use; only about 100 animals from the five grazing allotments adjacent to the study area actually enter lands adjacent to the river each year. Spring and late summer cattle drives do cross the area at Lumsden Bridge.

The lower Tuolumne River area experienced gold mining activity in the past, but today such activity is limited to recreational panning and dredging. Some potential for further gold mining, as well as for silver, limestone, and dolomite mining, does exist in the national forest portion of the river, but the remoteness and ruggedness of the area precludes the likelihood of major commercial mining in the

foreseeable future. Private land in this portion of the study area consists of several isolated parcels acquired through mineral patents, totaling 149 acres.

For the purposes of this study, a river corridor has been established on national forest lands in the Stanislaus National Forest and on the final mile of study river on lands administered by the Bureau of Land Management. The corridor is 30 miles long and encompasses 6,490 acres. Corridor width varies from one quarter mile to one mile. The corridor has been identified by the Forest Service for management purposes to ensure protection of the Tuolumne's streamside resources should Congress decide to designate the river a component of the National Wild and Scenic Rivers System. Most of the Tuolumne River within Yosemite National Park is included in the National Park Service's Yosemite wilderness proposal currently being considered by Congress. Excluded from this proposal are the developed portions of Tuolumne Meadows, the Dana Fork, and Hetch Hetchy Reservoir. The Tuolumne downstream of Hetch Hetchy is part of the recommended additions to the wilderness proposal.

Two areas of national forest land through which the river passes are currently a part of RARE II (Roadless Area Review and Evaluation), a study of the resource values and future uses of roadless areas within the national forests. One area (05256) encompasses five miles of the

YOSEMITE NATIONAL PARK
STANISLAUS NATIONAL FOREST
Columbia
Sonora
Jamestown
Tuolumne City
Big Oak Flat
Groveland
Moccasin
Coulterville
La Grange Dam
OON PEORO RESERVOIR
TUOLUMNE RIVER
NORTH FORK
CLAVEY RIVER
CHERRY LAKE
LAKE ELEANOR
CHERRY CREEK
ELEANOR CREEK
O'SHAUGHNESSY DAM
HETCH HETCHY RESERVOIR
Grand Canyon of the Tuolumne
Holm
Kirkwood
Early Intake
LUMSDEN ROAD
JANBOW RIDGE
05258
LUMSDEN BRIDGE
Mather
SOUTH FORK
TUOLUMNE RIVER
White Wolf Campground
Tuolumne Meadows Campground
DANA FORK
LYELL FORK
Tioga Pass
Mono Lake 11 miles
YOSEMITE VALLEY
Yosemite Village
120
49
132
LEGEND
STANISLAUS NATIONAL FOREST
Rare II Study Areas
River Study Corridor
BUREAU OF LAND MANAGEMENT
Potential Wilderness Study Areas
River Study Corridor
YOSEMITE NATIONAL PARK
1972 Wilderness Proposal
Proposed Additions
PRIVATE LANDS
NORTH
SCALE IN MILES
2 1 0 2 4 6
PROPOSED WILDERNESS AND IDENTIFIED ROADLESS AREAS
TUOLUMNE
WILD AND SCENIC RIVER STUDY
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river from the national park boundary west; the other area (05258) covers 14 miles of the river from Lumsden Campground to Bureau of Land Management land. Both areas are being managed to preserve wilderness values until a determination is reached on wilderness or nonwilderness designation. The Secretary of Agriculture recently announced his recommendations to include area 05258 for further planning and area 05256 for nonwilderness status.

The remaining one mile of river in the study area is managed by the Bureau of Land Management. Limited grazing is the only current nonrecreational use. The Bureau of Land Management has identified public lands adjacent to the Stanislaus National Forest's RARE II area 05258 as having potential for addition to the Wilderness System.

Recreation

Recreation has been and will continue to be the most popular use of the Tuolumne River, both within the wild and scenic river study area and downstream. The Tuolumne River is accessible to a large number of recreation users. The nearly five million residents of the San Francisco Bay Area are within a five-hour drive of the study river. The lower portions of the study river are even closer. The Sacramento Metropolitan Area is within two hours of the study river.

Yosemite's Tuolumne Meadows contains one of the largest campgrounds (600 campsites, 50 walk-in sites, and 66 tent cabins) in the national park system and serves as a major trailhead into the spectacular Yosemite backcountry. The number of visitors in the Tuolumne Meadows area reaches 3,000 per day during the peak summer season. An excellent trail system, including the Pacific Crest National Scenic Trail, crosses and parallels the study river. The number of overnight campers in the Tuolumne Meadows area exceeds 50,000 during the three-month summer season; hiking, backpacking, rockclimbing, sightseeing, photography, and fishing also are major recreation activities, with passive enjoyment of the resources also popular. Day hiking and backpacking are the most significant recreational uses of Yosemite's Tuolumne backcountry, where 1977 seasonal use amounted to 194,230 visitor days. Between Tuolumne Meadows and O'Shaughnessy Dam, a distance of nearly 30 river miles, no vehicular access to the river exists. This stretch of the river, except for Hetch Hetchy Reservoir, has been proposed for Wilderness designation by the National Park Service.

The portion of the study river within the Stanislaus National Forest is less developed for recreation due to rugged terrain and few access points; but fishing, hiking, and camping are very popular. Fishing in the Lumsden area usually exceeds 400 fishermen the opening day of fishing season and then levels off to less than 100 per day. The Lumsden area offers three campgrounds, each of which experiences over

TUOLUMNE RIVER
TUOLUMNE
WILD AND SCENIC RIVER STUDY
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YOSEMITE NATIONAL PARK
STANISLAUS NATIONAL FOREST
BUREAU OF LAND MANAGEMENT
BLM
LEGEND
STUDY RIVER
POWERLINE
TUNNEL / PIPELINE
POWERHOUSE
RIVER ACCESS
UNIMPROVED ROAD
NORTH
SCALE IN MILES
2 1 0 2 4 6
Stockton
Manteca
Escalon
Modesto
Ceres
Empire
Waterford
Columbia
Sonora
Jamestown
Tuolumne City
Groveland
Mariposa
Coulterville
Mather
Tioga Pass
Mono
11 miles
YOSEMITE VALLEY
Yosemite Village
White Wolf Campground
Tuolumne Meadows Campground
La Grange
SAN JOAQUIN RIVER
STANISLAUS RIVER
TUOLUMNE RIVER
TUOLUMNE COUNTY
STANISLAUS COUNTY
SAN JOAQUIN COUNTY
NEW MELONES RESERVOIR
New Melones Dam
Tulloch Dam
WOODWARD RESERVOIR REGIONAL PARK
CASWELL MEMORIAL STATE PARK
DON PEDRO RESERVOIR
New Don Pedro Dam
La Grange Dam
STANISLAUS COUNTY PARK
LA GRANGE REGIONAL PARK
MODESTO RESERVOIR REGIONAL PARK
Tuolumne River Resort (privately owned)
TURLOCK STATE REC AREA
LAVERN POTTS REGIONAL PARK
TUOLUMNE RIVER REGIONAL PARK
CLAIRE
CLAYEY
CHERRY LAKE
CHERRY CREEK
LAKE ELEANOR
O'Shaughnessy Dam
HETCH HETCHY RESERVOIR
Holm
Mariposa
Intake
Road
DANA FORK
LITTLE FORK

5,000 visitor-use days annually. In 1976, total use of the Tuolumne River canyon, from below Hetch Hetchy Reservoir to Don Pedro Reservoir, for all recreation activities, was estimated at 20,000 visitor days.

The unique recreational feature of the Lower Tuolumne is whitewater boating. The Tuolumne River from Lumsden Bridge to Wards Ferry is considered by whitewater experts (California Whitewater Advisory Board) to be one of the finest whitewater boating rivers in the Nation, comparing favorably with the Colorado River in Arizona and the Salmon River in Idaho. It combines a series of demanding rapids spaced at close intervals with the power and waves of larger rivers and requires no portages during the 18-mile run. The Tuolumne River has been designated by the State as a California Boating Trail from Hetch Hetchy Reservoir to Don Pedro Reservoir, and the State's Protected Waterways Plan includes this portion of the Tuolumne in its top grouping of rafting runs. With the Tuolumne offering more rapids and greater length than most other California rafting rivers and with the increasing popularity of whitewater boating, greater demands for rafting use are expected for this portion of the river.

Downstream of Don Pedro Reservoir, outside of the study river, significant outdoor recreation opportunities exist along the Tuolumne River. These opportunities are of a different nature and level than those found upstream. Moreover, they exist in closer proximity to users than those

within the study area. The river downstream is considerably more placid, providing a 53-mile canoe run and several public access points. State, regional, and county parks exist along this portion of the Tuolumne, as well as the Tuolumne River Resort, a privately owned park open to the public. Day-use facilities exist within these areas, and together they provide a total of 656 overnight campsites. Reservoirs such as Don Pedro, Turlock, and Modesto provide more than 18,000 acres of flatwater for boating and fishing opportunities.

Visual Resource

An extensive visual resource study has been done for the national forest portion of the Tuolumne River. Based on the interrelationships of water, landform, and vegetation typical to rivers, esthetic standards were developed with which the Tuolumne River could be compared and evaluated. In general, the Tuolumne's steep slopes, vegetative variety, and free-flowing water, and the contrasts between north- and south-facing slopes and between rocks and water, give it a high esthetic rating. Adding to this the near natural condition of most of its 30 miles, the lower Tuolumne River was found to possess outstandingly remarkable scenic value compared with other rivers within the same physiographic province.

As mentioned, a corridor suitable for wild and scenic river management purposes has been identified for the study river within the Stanislaus National Forest and on lands administered by the Bureau of Land Management.

No similar corridor study has been done for the river within Yosemite National Park since its inclusion in the National Park System already attests to its scenic resource value. Except for the Hetch Hetchy facilities and the Tioga Highway crossing, the park's unspoiled condition, its variety of landscape types, its vegetation, and its backcountry values allow the portion of the river in the Park to rank at least as high in esthetic value as the national forest portion.

Water Quality and Water Resources

Water quality studies done for various portions of the Tuolumne River indicate a generally high-quality water low in dissolved nutrients. Conductance, dissolved oxygen, pH, and other measurements are consistent with coldwater stream habitat. Within the Stanislaus National Forest, samples with coliform bacteria counts which exceed Federal standards for drinking water have been taken. This portion of the river is classified as nonpotable. In addition, two tributaries of the lower Tuolumne, South Fork and Big Creek, which pass through residential areas could add pollutants to the river. However, no significant water quality degradation has been measured to date.

Within Yosemite National Park, the portion of river at Tuolumne Meadows has shown high coliform and BOD levels associated with large numbers of recreation users and the proximity of a wastewater treatment plant. The National Park Service is reducing these levels and anticipates no contamination problems in the future.

Since passage of the Raker Act in 1913, San Francisco County has depended on the Tuolumne River Basin for much of its domestic water and electrical power. The Tuolumne River supplies water to 8 percent of California's population and hydroelectric power to the Turlock and Modesto Irrigation Districts as well as to San Francisco.

The City and County of San Francisco owns and operates all Raker Act facilities. These include three reservoirs, Hetch Hetchy on the Tuolumne River and Cherry Lake and Lake Eleanor on tributaries, as well as water diversion tunnels, powerhouses, and other impoundments. These facilities have resulted in drastic changes in river flows from those which would occur naturally without diversion or storage.

At Hetch Hetchy Reservoir, water is diverted through Canyon Power Tunnel. Except during times of heavy snowmelt when the reservoir's storage capacity of 360,360 acre-feet is exceeded, only a specified minimum flow is released from the dam: 35 cubic feet per second (cfs)

in fall and winter, 75 cfs during spring and summer (May 1 to September 15). Prior to completion of the tunnel in 1967, flow from the dam was 999 cfs on a yearly average. The diverted water is used to generate power at Kirkwood Powerhouse before continuing through a mountain tunnel to Moccasin Powerhouse and then to the San Francisco Bay Area. Diverted water in excess of this tunnel's capacity is returned to the river at Early Intake.

Water from Lake Eleanor and Cherry Lake reservoirs is also diverted by tunnel, to Holm Powerhouse just above the Cherry Creek confluence, and then returned to Cherry Creek, from which it flows into the Tuolumne. Holm Powerhouse is operated on a peak load basis, which can result in daily fluctuations in water release. No other Raker Act facilities are located within the study area. However, there is potential for development of additional power generation and water supply on the Tuolumne River.

Cultural

The entire Tuolumne River study area, from high in Yosemite down to Don Pedro Reservoir, shows evidence of man's presence dating back as much as 4,000 years. The Miwok Indians inhabited the Tuolumne and Stanislaus River canyons for most of this period, reaching a population in Tuolumne Canyon of 2,700 persons prior to the gold rush of the 1850's.

The Miwoks subsisted on game and seasonal plant foods, primarily acorns, and also traded with the Paiutes of the Great Basin to the east over Sierra Nevada passes. Seasonal migration routes were located within the Tuolumne River Canyon. There is evidence of summer home sites in Tuolumne Meadows and permanent home sites around Lumsden, as well as at other sites along the river. It is estimated that some 250 Miwok sites exist within the study corridor.

Although no Tuolumne River sites are currently listed in the National Register of Historic Places, several areas in Yosemite National Park have been proposed for inclusion as archeological districts; and some areas in the lower study area may be proposed. With the inundation of much of the Stanislaus River Canyon, the Tuolumne River archeological sites become especially important as clues to the Miwok Indian's heritage.

Gold rush history is also much in evidence in the study area, especially along the lower Tuolumne. Gold was extensively mined throughout the Sierra foothill area until the 1920's.

Economic and Social

Tuolumne County, within which the entire river study area falls, has an economy based primarily on resource extraction and tourism. Since the decline of gold mining, lumber production has provided a major source

of employment and income, while recreation and tourism are becoming increasingly important. The largest manufacturing employer is the lumber and wood products industry.

Employment in Tuolumne County in 1976 was 9,150 persons, about 33 percent of the population. Almost one-third of this employment was furnished by Federal, State, and County governments and another one-third by the services and trades.

Unemployment in Tuolumne County is high: 13.5 percent in 1976. This is due partly to increases in population without a corresponding increase in industry, and partly to the seasonal nature of the logging, construction and tourism industries. Unemployment is generally much higher than the California and National averages, and during winter months can soar to over 20 percent. Some improvement may result from the development of more winter sports facilities, but no significant change is foreseen for the near future.

Median personal income in Tuolumne County for 1975 was $9,076. However, 9 percent of families fell below the poverty level. Total personal income for the county increased over 40 percent from 1970 to 1974.

Tuolumne County is essentially rural. Its 1977 population of 28,650 persons represents an average population density of only 12.7 persons

per square mile, compared with a California average of over 130 persons per square mile. Nevertheless, Tuolumne County's growth has been considerable, with a 29 percent increase since 1970.

Minority population is about 11 percent of the total. Hispanics are the largest group represented, but the numbers of blacks and American Indians are also significant. The county has an above-average percentage (over 12 percent) of persons 65 years of age or older.

III. EVALUATION CRITERIA FOR RIVER ELIGIBILITY

The first step in a wild and scenic river study is to determine whether or not the study river or certain segments meet the eligibility criteria. That is, does the Tuolumne River, from its sources in Yosemite National Park downstream to the headwaters of Don Pedro Reservoir, possess the "outstandingly remarkable" values identified in the Wild and Scenic Rivers Act so as to warrant preserving its free-flowing nature? River "segments" have been delineated for the purpose of identifying these values (see Table III-1). These segments were treated as separate units for analysis because they possess natural or manmade boundaries. Dana Fork and Lyell Fork are the headwaters of the main Tuolumne, coming together in Tuolumne Meadows. Hetch Hetchy is an eight-mile long reservoir created by O'Shaughnessy Dam, and Early Intake is a diversion dam. Below Early Intake, beginning with Cherry Creek a series of tributaries join the Tuolumne and increase the river flow. For each segment, an analysis of river values has been carried out to determine eligibility under the Wild and Scenic Rivers Act.

Once these values have been identified, the next step is the classification process, based on the condition of the river resource at the time of study. That is, eligible segments are evaluated and recommended for classification based on their present condition. Rivers can be classified in three categories:

1. Wild river areas - Those areas or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive, and waters unpolluted. These represent vestiges of primitive America.

2. Scenic river areas - Those rivers or sections of rivers that are free of impoundments with shorelines or watersheds still largely primitive and shorelines largely undeveloped but accessible.

3. Recreational river areas - Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shoreline, and that may have undergone some impoundment or diversion in the past.

In determining both eligibility and classification, the study team exercised its judgment, not only for each of the eligibility criteria as they applied to a particular segment of the river but as they applied to the river system as a whole. It should be understood that the criteria are not absolutes; they could not be written so as to indicate automatically which river segments are eligible and how they should be classified. Accordingly, the entire river system and its immediate land area were considered as a unit, with primary emphasis upon the quality of the experience obtained and the overall impressions and perceptions of the public while using the river.

Table III-1
Delineated Segments for Identifying Values

RIVER SEGMENTS

1. Dana Fork Source to Tuolumne Meadows
2. Lyell Fork Source to Tuolumne Meadows
3. Tuolumne Meadows to Hetch Hetchy (maximum pool)
4. Hetch Hetchy (maximum pool) to O'Shaughnessy Dam
5. O'Shaughnessy Dam to Early Intake
6. Early Intake to Cherry Creek Confluence
7. Cherry Creek Confluence to Study Terminus

RIVER SEGMENTS

	1	2	3	4	5	6	7
OUTSTANDINGLY REMARKABLE VALUES:	8 mi.	13 mi.	26 mi.	8 mi.	12 mi.	2 mi.	23 mi.
Scenic	YES	YES	YES	YES	YES	NO	YES
Recreation	YES	YES	YES	YES	YES	YES	YES
Geologic	YES	YES	YES	YES	YES	NO	YES
Fishery	NO	NO	YES	YES	NO	NO	YES
Wildlife	YES	YES	YES	YES	YES	YES	YES
Historic/Cultural	YES	YES	YES	YES	YES	YES	YES
Whitewater Boating	NO	NO	NO	NO	NO	NO	YES
Scientific/Educational	YES	YES	YES	YES	YES	YES	YES
Wilderness Characteristics	NO	YES	YES	YES	NO	NO	NO
WATER QUALITY MEETS CRITERIA FOR:							
Contact Recreation	YES	YES	YES	YES*	YES	YES	YES
Water Esthetics	YES	YES	YES	YES	YES	YES	YES
Fishery Propagation	YES	YES	YES	YES	YES**	YES	YES
Drinking and Domestic Use	NO	NO	NO	NO	NO	NO	NO
FREE FLOWING NATURE AFFECTED BY:							
Impoundments	NO	NO	NO	YES	NO	YES	NO
Diversions	NO	NO	NO	YES	NO	YES	NO

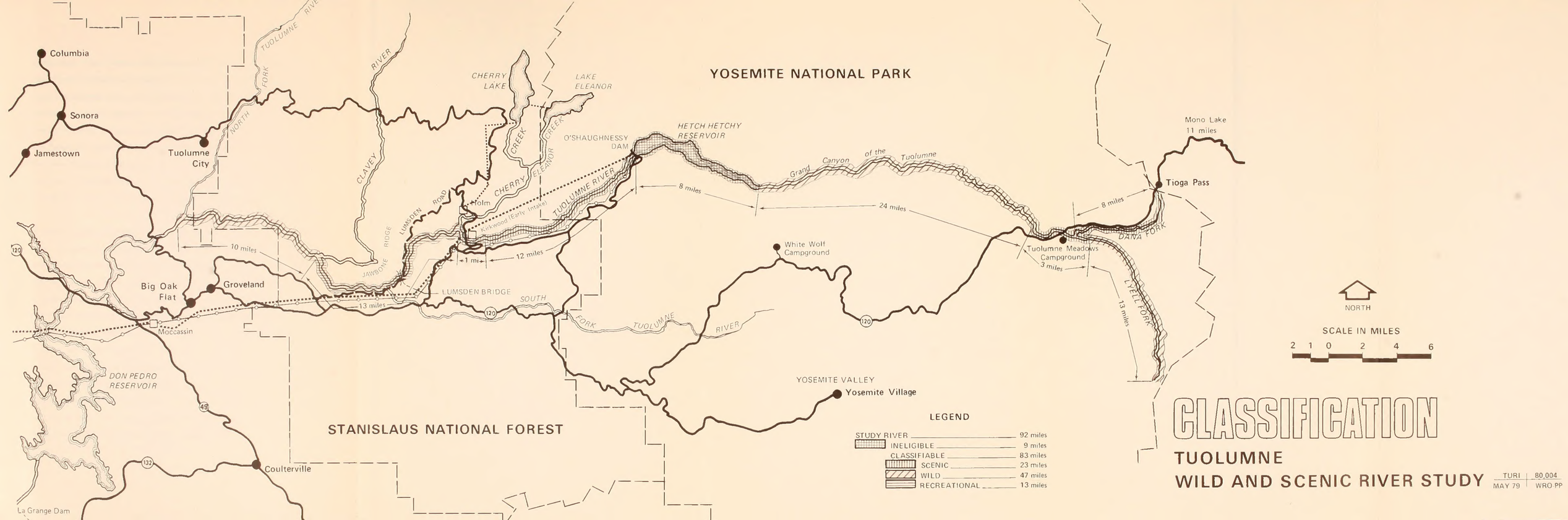
* Body contact prohibited under terms of Raker Act. Reservoir serves as municipal water supply for the City and County of San Francisco.

** While water quality is suitable for fishery propagation, flow releases from O'Shaughnessy have been shown to be inadequate.

As a result of the eligibility and classification processes, all 92 miles of the Tuolumne River examined in this study, with the exceptions of the 8-mile long Hetch Hetchy Reservoir and a 1-mile area around the Early Intake Diversion Dam, meet criteria prescribed in the Act for either a wild, scenic, or recreational classification and thus are eligible for inclusion in the National Wild and Scenic Rivers System. O'Shaughnessy Dam, Hetch Hetchy Reservoir, and the Early Intake Diversion Dam were identified as significant structures not in keeping with the criteria. The exclusion of 9 miles determined to be ineligible leaves a total length of 83 miles which can be designated.

Beginning with the Tuolumne's origins in Yosemite National Park, the study team applied the criteria in Section 2(b) of the Wild and Scenic Rivers Act and the supplemental criteria outlined in Guidelines for Evaluating Wild, Scenic and Recreational River Areas Proposed for Inclusion in the National Wild and Scenic Rivers System. Based on a normal water year (i.e., normal operation at Holm powerhouse), the recommendation of the study team is that the 83 miles of the Tuolumne River be classified as follows:

Segments from sources (Lyell Fork, 13 miles, and Dana Fork, 8 miles, to Tuolumne Meadows Campground, 21 miles) - The Tuolumne River has two main sources: Lyell Fork, which originates on the north slope of Mt. Lyell, and the Dana Fork, which arises in the vicinity of Mt. Dana and



CLASSIFICATION

TUOLUMNE WILD AND SCENIC RIVER STUDY

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Tioga Pass. The 13-mile Lyell Fork portion of the Tuolumne, due to its primitive character, qualifies for "wild" classification from its origin downstream to a point approximately one-quarter mile above the Tuolumne Meadows Campground. The remainder of the Lyell Fork to its confluence with the Dana Fork, where the Tuolumne forms, meets criteria for "scenic" classification due to its proximity to the heavily used Tuolumne Meadows Campground. The entire 8-mile Dana Fork, due to its proximity to Highway 120 and because of various developments along its course, meets criteria for a "scenic" classification.

Segment through Tuolumne Meadows (3 miles) - Tuolumne Meadows contains more development (600 campsites, 50 walk-in sites, and 66 tent cabins) and attracts more people (51,206 overnight campers, June to August 1977) than any other area within the study river. The Tioga Road bisects Tuolumne Meadows and crosses the river at a point just downstream from the confluence of the Dana and Lyell forks. Strip development along the road is visible from the river, and vehicles using the road system can be seen and heard from points along the river. With the exception of the bridge, the river has not been adversely impacted by development. Water quality and clarity are exceptional, and present National Park Service plans are to improve and protect the outstanding visual quality of this section of the river and its meadow setting. This segment meets criteria for "scenic" river classification.

Segment from Tuolumne Meadows to the headwaters of Hetch Hetchy Reservoir (24 miles) - This segment of the river begins at the proposed wilderness boundary near the west end of the meadow and continues downstream through the Grand Canyon of the Tuolumne to the highwater elevation of the reservoir. This segment of the river is inaccessible by road and is served by a system of trails. The only man-made developments along this stretch of the river, with the exception of several foot bridges, are the temporary facilities of the High Sierra Camp at Glen Aulin. Any detraction caused by the camp is minor when compared with the over-all primitive character of this section of the river. This segment of the river meets criteria for a "wild" classification.

Segment at Hetch Hetchy Reservoir (8 miles) - The reservoir has a maximum storage capacity of 360,360 acre-feet. The dam is a concrete structure, approximately 370 feet high, with a total length of 910 feet. The dam structure and the eight-mile-long impoundment make this portion ineligible for inclusion in the Wild and Scenic Rivers System.

Segment from O'Shaughnessy Dam to Early Intake (12 miles) - About six miles downstream from the dam, the river leaves the National Park and enters the Stanislaus National Forest. There is access to this segment of the river by paved road at O'Shaughnessy Dam and Early Intake. Additional access is by trail from the two road ends and by unmarked trails from two points along the south rim of the canyon. Due to

inadequate flow releases from Hetch Hetchy Reservoir, this river segment is not an exceptional fishery. Despite the low flows, there is considerable recreational potential. In addition, the quality and variety of the scenic resources along the segment are outstanding and suitable for "scenic" classification.

Segment Centered at Early Intake (1 mile) - Early Intake Diversion Dam, a concrete arch structure 81 feet high, with a crest length of 262 feet, creating a reservoir with 155 acre-feet of water storage is located some 12 miles downstream from O'Shaughnessy Dam and Hetch Hetchy. Along with the diversion dam and reservoir, a powerhouse, accessory facilities, and a small residential community are located in this segment of the Tuolumne. Additionally, there is extensive rip-rapping of the Tuolumne's streambed here to protect the residences and switchyard facilities. Including the diversion dam, this one-mile segment of the Tuolumne, centered at Early Intake and extending to the Cherry Creek confluence, is considered ineligible for designation.

Segment from Cherry Creek confluence to Clavey River confluence (13 miles) - This segment of the river experiences significant increases in water flow from power generation releases during peak electrical load periods. These releases can vary from zero to almost 950 cfs in a matter of hours. There are no regularly scheduled hours for powerhouse operation. The only required flows are fishery releases

of 5 to 15 cfs on Eleanor and Cherry Creeks. Also, much of this segment of the river is impacted by the presence of secondary roads, most noticeably the Lumsden Road. This road is visible from the Tuolumne for more than 8 miles. Beginning at Lumsden Bridge, it parallels the river for about 3 miles, averaging about 100 feet from the river's edge. Due to steep slopes and open vegetation, road cuts and fills are visible from the river. In addition, there are 2 campground sites with developed facilities located on the banks of the Tuolumne. The cumulative effect of these resource uses makes this segment of the Tuolumne eligible for a "recreational" classification.

Segement from Clavey River confluence to Study End (10 miles) - Downstream of the Clavey confluence, water flows in the Tuolumne are sufficient to maintain a premium coldwater fishery and provide for whitewater boating, as well as other water-related activities. No roads or campgrounds directly impact the river here, and the corridor remains essentially undisturbed. This segment of the river, which includes the one-mile reach of river flowing through lands administered by the Bureau of Land Management, meets the criteria for "wild" classification.

IV. ALTERNATIVES AND IMPACTS OF ALTERNATIVES

The primary purpose of a study under the Wild and Scenic Rivers Act is to determine whether or not a river is suitable for designation as a component of the National Wild and Scenic Rivers System. The Act requires that the study consider and the report show, ... "the reasonably foreseeable potential uses of the land and water which would be enhanced, foreclosed, or curtailed if the area were included in the national wild and scenic rivers system ...." Also, other legislation, such as the National Environmental Policy Act, and administrative regulations stress the need for studies to consider a range of options for the future management and use of the area, taking into consideration the environmental, economic, and social effects of these options. To this end, the following alternate plans have been developed for consideration by decisionmakers.

A. Designation of all eligible segments of the Tuolumne River (83 miles)

B. Designation of those eligible segments above Early Intake (60 miles)

C. Designation of all eligible river segments except a 2-mile segment below Early Intake and a 1-mile segment at the confluence with the Clavey river (80 miles)

D. Designation of those eligible segments above the confluences with the Clavey River (73 miles)

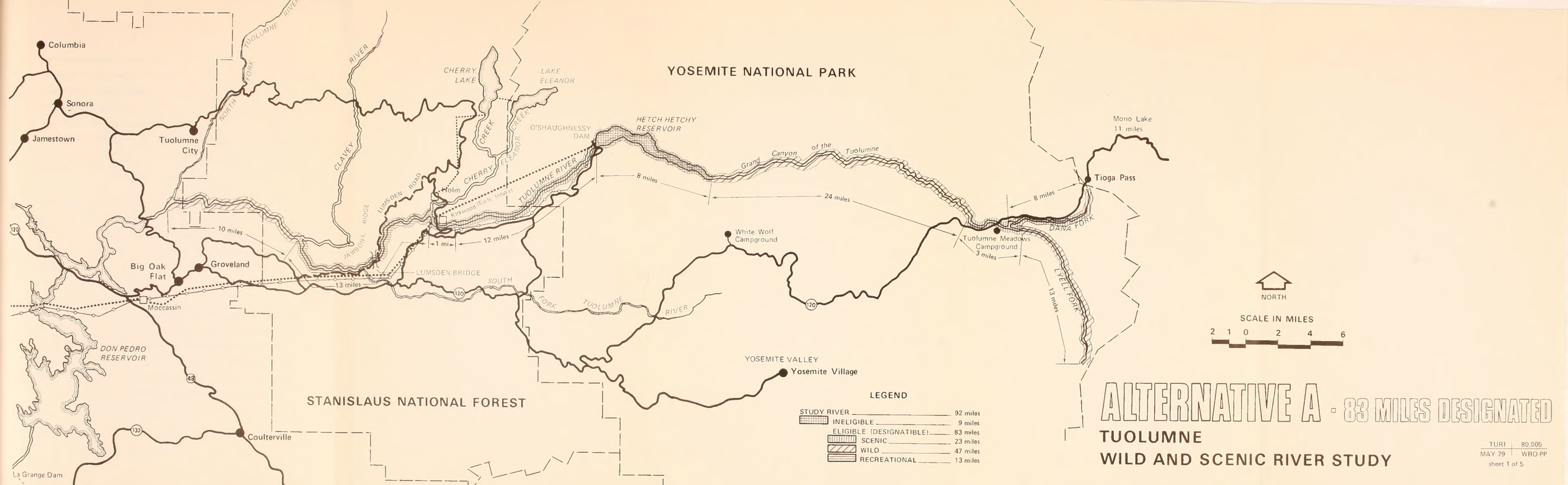
E. No designation (no action).

ALTERNATIVE A (DESIGNATION OF ALL ELIGIBLE SEGMENTS)

Under this alternative, all eligible segments of the river would be designated for inclusion in the Wild and Scenic Rivers System. A total of 83 miles of the Tuolumne River would be managed and protected under the Wild and Scenic Rivers Act.

The Tuolumne River within Yosemite National Park is classified as follows: Two segments, most of Lyell Fork (13 miles) and the portion of the Tuolumne River between Tuolumne Meadows and the headwaters of Hetch Hetchy Reservoir (24 miles), would be classified as "wild." The Dana Fork-Tuolumne Meadows segment (8 and 3 miles, respectively) and the segment of the river below Hetch Hetchy Reservoir to the park boundary (6 miles) qualify for "scenic" classification. The Dana Fork-Tuolumne Meadows portion is so classified because of the proximity of Highway 120 and the developed campgrounds in the meadows; the portion below Hetch Hetchy Reservoir is so classified due to low (35-75 cfs) flow releases from O'Shaughnessy Dam.

The 6-mile segment of the Tuolumne River from the park boundary west to the Early Intake exclusion would be classified as "scenic" due to


YOSEMITE NATIONAL PARK
STANISLAUS NATIONAL FOREST
Columbia
Sonora
Jamestown
Tuolumne City
Big Oak Flat
Groveland
Moccassin
Coulterville
DON PEDRO RESERVOIR
La Grange Dam
TUOLUMNE RIVER
NORTH FORK
CLAVEY RIVER
JAWBONE RIDGE
LUMSDEN ROAD
CHERRY LAKE
LAKE ELEANOR
CHERRY CREEK
ELEANOR CREEK
O'SHAUGHNESSY DAM
HETCH HETCHY RESERVOIR
Holm
Kirkwood (Early Intake)
LUMSDEN BRIDGE
SOUTH FORK TUOLUMNE RIVER
Grand Canyon of the Tuolumne
White Wolf Campground
Tuolumne Meadows Campground
DANA FORK
LYELL FORK
Tioga Pass
Mono Lake 11 miles
YOSEMITE VALLEY
Yosemite Village
10 miles
13 miles
1 mi
12 miles
8 miles
24 miles
8 miles
3 miles
13 miles
120
49
132
NORTH
SCALE IN MILES
2 1 0 2 4 6
LEGEND
STUDY RIVER 92 miles
INELIGIBLE 9 miles
ELIGIBLE (DESIGNATIBLE) 83 miles
SCENIC 23 miles
WILD 47 miles
RECREATIONAL 13 miles
ALTERNATIVE A - 83 MILES DESIGNATED
TUOLUMNE
WILD AND SCENIC RIVER STUDY
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controlled flows from Hetch Hetchy Reservoir. From Cherry Creek confluence to the Clavey confluence (13 miles) the river would be classified as "recreational." The presence of Lumsden Road, which parallels and can be seen from the river, and the presence of campgrounds, raft launching facilities, and the bridge located along this segment of the river are responsible for this classification. The remaining river segment, from the Clavey confluence to study end (10 miles), would be "wild."

Within Yosemite National Park impacts on river values are minimal due to the current management by the National Park Service at a level which provides protection consistent with the intent of the Wild and Scenic Rivers Act. However, until Congress acts on the 1972 Yosemite wilderness proposal no statutory protection exists for wild and scenic river values in the park.

The draft Yosemite General Management Plan (GMP) and its accompanying draft Environmental Statement, released in August 1978, identify how the National Park Service proposes to manage the park's natural resources, how visitor use will be provided for, what developments there will be and where they will be located. The Tuolumne River, as one of those natural resources, is covered in the GMP.

The GMP includes a Management Zoning Plan which divides the park into several zones based on management objectives, significance of the resources, and legislative constraints. These zones are the Natural Zone, the Cultural Zone, the Development Zone, and the Special Use Zone. The great majority of the Tuolumne River falls within the Natural Zone except for the eight miles of Hetch Hetchy Reservoir in the Special Use Zone and about three miles in the Tuolumne Meadows area where the Cultural Zone and Development Zones overlap.

The Natural Zone is divided into three subzones. The Wilderness Subzone permits natural systems and processes to follow their course with minimum intrusion by man. The number of visitors will be limited to a level which does not significantly affect natural environments. The Natural Environment Subzone permits roads, picnicking areas, and trailheads; but development will be minimal. The Outstanding Natural Feature Subzone contains natural features of outstanding significance which are not within proposed wilderness areas. Management will provide maximum protection from man's activities.

In the Cultural Zone, which is comprised of historical and archeological subzones, management will emphasize the preservation of

architecturally and historically significant resources. When this causes unacceptable alteration of natural resources or processes, natural values will prevail.

The Development Zone contains facilities required for visitor use and park operations. Overall GMP goals for Tuolumne Meadows revolve around reducing the congestion that occurs during the peak summer season and removing development from the meadows. These are to be accomplished by reducing campground size and placing development in the adjacent lodgepole pine areas.

While significant levels of development will remain in the Tuolumne Meadows area, the type and level of visitor use permitted in the proposed GMP will not significantly impact the meadow ecosystem. The overall goal of the GMP is to orient development and use away from the fragile meadow ecosystem. Therefore, impacts on the river itself will be lessened as a result of implementation of the GMP.

Wild or scenic designation of segments of the river (54 miles) within the park would call for river management that would not differ essentially from present or future management, and no significant changes in resource values or uses are expected. Preservation of wild and scenic values might necessitate limits on some recreational activities within the park, but that is a consideration also in line

with the proposed GMP. As a result of the protected status of the river within Yosemite National Park, the following discussion of impacts will center on the lower 29 miles of the Tuolumne River administered by the Forest Service and the 1 mile administered by the Bureau of Land Management.

Impact on Recreation - Implementation of this alternative would provide long-term protection of the outstanding resources and values of the river corridor. As previously mentioned, inclusion in the system would ensure the provision of a variety of recreational opportunities, including fishing, rafting, kayaking, hiking, sightseeing, camping, and nature study. Under this alternative, recreational use on the Forest Service portion is estimated to increase approximately 30 percent to 52,500 visitor days annually, with a one-time facilities construction cost of approximately $500,000 and a cost of $75,000 to $100,000 for annual operation and maintenance. This alternative also would ensure the continuation of recreation diversity and, in particular, those activities that require the special and limited resource base of flowing water. Within this area is a stretch of river with outstanding recreational and natural values - the 18-mile whitewater run from Lumsden to Wards Ferry. This alternative would not attempt to maximize recreation use along the river. About 15 miles of the river are currently accessible only by foot or by raft. It is not the intent of this alternative to open

these areas to vehicular access or to develop them for intensive recreation use. Recreation development included in this alternative would be at existing sites and would not require road building or extensive construction of new facilities.

There is an undetermined but finite capacity of the environment of the river to withstand increasing use without deterioration of resource values. Existing recreational activities would continue and the levels of use increase as the area becomes better known and as other whitewater streams are inundated by water development projects. Future recreational use would be limited to the amounts and types of outdoor recreation consistent with the objective of maintaining or improving the quality of the existing river environment. The Forest Service presently limits the number of commercial rafting trips on the whitewater run between Lumsden and Don Pedro Reservoir to approximately 3,000 recreation days. Future limitations on noncommercial trips will probably be necessary if the Tuolumne is to continue to provide a high-level recreation experience.

Public recreation use of the river will increase about 12 percent by 1985 whether or not the river is added to the National Wild and Scenic Rivers System; however, inclusion of the river in the system probably would increase the visitation at a greater rate. Therefore, the visitor-day capacity would likely be reached sooner. Increased

visitor use could cause increased environmental damage, both at facility sites and throughout the river corridor, from overuse, vandalism, litter, undesirable noise, or deviant behavior. The limited use of off-road vehicles on the national forest portion of the river would be subject to more stringent controls. The limited new development associated with this alternative would result in some minor disturbance of plant and animal life and an increase in fire danger.

Impact on Scenic Quality - The outstanding scenic values which qualify the area for designation would be protected against any adverse construction activity which might occur along the river. As a result of the protective status the impact of designation would be beneficial.

Impact on Water Resources Management and Development - Two major water resource projects have been identified that would affect the 24 miles of the study river from Early Intake to Don Pedro Reservoir. The two proposed units are the Clavey unit, capable of producing an average of 708 Million Kilowatt-hours annually, and the Wards Ferry unit, capable of producing an average of 315 Million Kilowatt-hours annually. Implementation of this alternative would prevent development of these projects.

The Secretary of the Interior has the legal authority and responsibility to establish whatever flow releases from O'Shaughnessy Dam are deemed necessary in order to maintain fisheries, recreation, and esthetics. The existing flow schedule was established as an interim schedule and may be modified. Because of the Secretarial authority and the values involved, it may be appropriate for the Secretary to consider not only an increased final flow schedule but, corollary to such action, establishment of periods (daily, weekly, annually, etc.) when whitewater recreation or other values could best be accommodated without unjustifiable hardships to other water users. Such an action would result in a net loss of potential power generated at Raker project facilities but would not affect water yield or total available water. Implementation of this alternative is not contingent upon such an increase nor is implementation of the recommended releases contingent upon the addition of the Tuolumne River to the Wild and Scenic Rivers System.

If this alternative were implemented, it would be proposed that flow release standards be considered for the Cherry Creek tributary, an action which could reduce the amount of power generated by operation of upstream power facilities. The existing flow regime for Cherry Creek confluence is entirely dependent on water released from hydroelectric facilities at Cherry Lake and Holm powerhouse. Flows in the Tuolumne River below the Cherry Creek confluence are highly

dependent on the Cherry Creek releases, particularly during the summer recreation season.

Impact on Fish and Wildlife - If this alternative were implemented, the increased attention that would be accorded the river would increase fishing pressure less than 5 percent. Under sound management, including no new access, the continued remoteness of the river canyon areas would be assured; and the lack of vehicular access to most of the river would serve to minimize the pressure on the fishery resource.

Designation of the river would preserve the existing cold water stream habitat for the Tuolumne River trout fishery.

The recreation development included in this alternative would not require road building or extensive construction of facilities which would be disruptive to habitat. However, the general increase in recreation use (approximately 30 percent) along the river would have a slight disruptive effect on wildlife. While deer hunters may occasionally find their way into the canyon, the lack of road access, the presence of slopes densely vegetated with poison oak and other shrubs, and the steepness of the topography (slopes up to 70 percent) are all deterrents to hunting. These conditions would prevail under management of the river as a component of the Wild and Scenic Rivers System.

The protection of riparian habitat along 29 miles of river, an important zone for wildlife, would be assured. By assuring the continuation of the stream in its free-flowing condition, the well-being of stream-reliant species, such as beaver and otter, would be assured. Wild and Scenic River designation would also assure the continuation of the existing undisturbed and isolated nature of long reaches of the canyon. This kind of remoteness is necessary for the propagation and continued survival of such protected species as the mountain lion and the bald eagle.

In summary, this alternative would result in an overall long-range protection of fish and wildlife values by preserving the habitats and environmental niches.

Impact on Transportation - There are no major highways providing direct access to the Tuolumne River Canyon, where the increased recreation use would be likely to occur nor are there any proposals for new roads or river crossings within the river corridor. The only major highway crossing for the entire study reach is the Tioga Road at Tuolumne Meadows within Yosemite National Park, and it is unlikely that any significant increase in park visitation would result. Areas outside the park where visitation is likely to be increased are Early Intake, Lumsden, and the rafting take-out point at Wards Ferry. Access to these areas is presently by secondary roads.

The Lumsden area, served by a Forest Service single-lane dirt road, would be particularly impacted by additional use. However, the inadequacies of the road, such as sharp curves, steep vertical grades, and a rough road surface, tend to hold operating speeds to a safe level (approximately 10 to 15 mph). This existing difficulty of access is considered to be a deterrent to overuse of the area. An increase in future use could warrant upgrading of the road particularly to reduce hazards to public safety. Extensive road improvement could only serve to invite more people into the area than the narrow canyon could reasonably accommodate.

The area at Early Intake is served by a paved secondary road. The amount of additional traffic generated by the development of new recreation facilities along the flat areas in the canyon above Early Intake probably would not be sufficient to warrant upgrading of the present road. However, this road also serves other locations in the general area, including Cherry Lake. The overall increase in future use, therefore, could warrant an upgrading of the road. Additional studies would be needed to determine total use projections for the area and the amount of expenditure needed for any proposed improvements. The Wards Ferry area above Don Pedro Reservoir would be affected by this alternative because of its use as a rafting take-out point. The existing paved county road serving the area would not be

significantly impacted by the increase in traffic generated by an approximately 25 percent increase in the number of people floating the river.

If new road projects should be proposed in the future, the Wild and Scenic Rivers Act, Section 13 (g), makes the following provision:

> The Secretary of the Interior or the Secretary of Agriculture, as the case may be, may grant easements and right-of-way upon, over, under, across, or through any component of the national scenic rivers system in accordance with the laws applicable to the national park system and the national forest system, respectively: provided, that any conditions precedent to granting such easements and rights-of-way shall be related to the policy and purpose of this Act.

This alternative would result in an increase in recreation use of approximately 30 percent, thereby resulting in an increase in traffic on existing roads within the general area. However, the increase in recreation use would have an insignificant impact on major highways leading into the area.

Impact on Mining - Mining activity within the study area consists of small-scale recreational gold mining. Historically, a relatively

small amount of gold and silver has been extracted from the lower canyon. Present mining activity is located primarily within the last three miles of the study corridor above Don Pedro Reservoir.

There are no ongoing commercial mining operations within the corridor. Mining activity mainly consists of individuals with small, recreation-type operations. The mineral extraction that might be precluded by designation is not a significant source of income or employment to the local area.

There would be an impact on those mining claims (gold and silver) within the river corridor that have not yet been perfected. Such claims would be subject to regulations that would be necessary to effect the purposes of the Wild and Scenic Rivers Act. Subsequent perfections of mining claims or issuance of patents would convey a right or title only to the mineral deposits and would be subject to regulations that would protect other values and resources. Section 9(a)(iii) of the Wild and Scenic Rivers Act reads as follows:

> ... subject to valid existing rights, the minerals in Federal lands which are part of the system and constitute the bed or bank or are situated within one-quarter mile of the bank of any river designated a wild river under this Act or any subsequent Act are hereby withdrawn from all forms of appropriation under the mining

laws and from operation of the mineral leasing laws including, in both cases, amendments thereto.

In summary, the impact of designation is minor.

Impact on Soils and Vegetation - Minor damage to riparian vegetation from treading and trampling could occur in areas where fishing use is concentrated. Overnight campsites, trails, and other visitor use areas may sustain soil compaction that could be detrimental to vegetation. Wood gathering for campfires, if not properly controlled, could also take a heavy toll on vegetation. Adverse effects on soils and vegetation resulting from any mining activity which might occur would be minimized by the regulations and restrictions which would be applied to these activities.

During the recreation season, the fire danger can be extremely high; and the increase in visitations would increase the risk of man-caused fires within the canyon. Fires could have a temporarily devastating effect on existing vegetation and could result in increased erosion.

The current management of off-road vehicles in the corridor may need to be re-examined to see if it is compatible with wild and scenic river management.

Implementation of this alternative would preserve and provide long-range protection for the vegetation, particularly the significant riparian habitat, along 29 miles of river.

Impact on Grazing - There would be no impact on the limited amount of grazing which takes place in the area.

Impact on Air and Water Quality - The present air and water quality of the Tuolumne River Canyon is generally exceptionally good although water samples with coliform bacteria counts exceeding Federal standards for drinking water have been taken on the segment within the national forest. Waters in that segment are not of potable quality. Most of the upper canyon is contained within Yosemite National Park and the Stanislaus National Forest. No future degradation of air and water quality is anticipated. However, downstream tributaries could contribute pollution to the river from residential areas outside of Federal (Forest Service) jurisdiction and outside of the study area. Wild and Scenic River designation has no effect one way or the other on this possibility.

The impact of this alternative on air and water quality is not considered to be significant. If the Tuolumne River is added to the National Wild and Scenic Rivers System, land uses within the corridor that could impact air and water quality would be controlled. An

increase in recreational use could contribute to water pollution through indiscriminate disposal of human wastes and general littering. This alternative is expected to result in the provision of needed sanitation facilities in areas that are currently receiving recreational use.

Impact on Historical and Archeological Values - The entire study area shows evidence of man's presence dating back 4,000 years. The Miwok Indians who inhabited this area for most of the period reached a population in the canyon of 2,700 persons prior to the gold rush of the 1850's. It is estimated that there are some 250 Miwok sites in the area including summer home sites in the Tuolumne Meadows area and permanent sites in the Lumsden area. Two recent archeological reconnaissance projects have examined two areas - from Lumsden campground to a point two miles upstream from Lumsden Bridge and from Early Intake to near the Yosemite National Park boundary. These two surveys established existence of significant archeological and historical sites throughout the area. With the inundation of much of the Stanislaus River Canyon, the archeological sites in the Tuolumne River Canyon become especially important for interpreting the Miwok Indian heritage. Evidence of the early gold rush period also exists especially along the lower portion of the study area.

Implementation of this alternative would have both beneficial and adverse effects on the historical and archeological resources. It would protect the resources from future adverse impacts such as inundation by extensive water development projects, but it could also adversely impact the resources through increased visitation to the area. The remoteness of much of the canyon area and the extensive distribution of the sites would make it very difficult for the managing agencies to provide protection from vandalism and removal of artifacts.

Impact on Land Ownership and Use - With the exception of a number of scattered privately owned tracts which are perfected mining claims totaling 149 acres, the study corridor is comprised of lands in Federal ownership. No land acquisition except scenic easements to restrict use of privately owned lands, if judged to be necessary, would be expected as a result of implementation of this alternative. The major impact on existing land use would be the curtailment or regulation of any future mining operations on nonperfected mining claims and the curtailment of mineral prospecting and exploration on lands that would be placed on "withdrawn" status. Continuation of recreational mining in the river would be assured but regulated. The impact on land ownership and use would be minimal.

Impact on the Local Economy - The "local economy" is considered to be synonymous with the Tuolumne County economy. Currently, recreation-oriented businesses catering to the demands of tourists, vacationers, and sportsmen predominate in communities throughout the county.

Implementation of this alternative would focus national attention on the area and would result in a 30 percent increase in the number of visitors. Sectors of the economy that would benefit from increased visitation would be recreation- and service-oriented businesses such as gasoline/service stations, sporting goods retailers, kayak and raft rental operations, guide and outfitting operations, private campgrounds, motels, restaurants, and miscellaneous retailers. However, maximum resource use capacity for recreation is expected to be reached within a few years even without implementation of this alternative.

The alternative would preserve and maintain the commercial rafting enterprises currently operating on the Tuolumne. Using a U.S. Forest Service estimate of 3,000 commercial recreation days spent on the river in 1978 and an average figure of $70 per recreation day in daily receipts, it can be estimated that in 1978, the commercial rafting business generated a gross income of about $210,000. Since the commercial rafters are already operating at near capacity

(subject to U.S. Forest Service use restrictions), only marginal opportunities exist to expand this source of income and employment.

Search and rescue, law enforcement, and fire control costs could be expected to increase with the presence of more recreation use on and near the river. Some of these emergency services would continue to be provided at the local level, including hospital services and search and rescue operations. Fire protection along the entire study river will continue to be the responsibility of the appropriate Federal managing agency. The monitoring and policing of river-oriented recreation uses by the Federal managing agencies should provide some preventive assistance. Road maintenance costs could be expected to increase slightly, although only one of the access routes to the river, Wards Ferry Road, is a county road. The others are maintained by the Federal land managing agencies.

This alternative would have minor impacts on the timber industry since implementation would require the reclassification of only 189 acres (constituting 3,348,000 board-feet) in the river corridor. This classification would require more restrictive timber harvesting guidelines, which could increase the costs of logging those 189 acres; the overall effect on the timber industry, however, would be insignificant.

The economic impact on mining activity within the river corridor would be minor, since much or all of this is recreational rather than revenue-producing. Given the small scale involved, it seems reasonable to conclude that the current mining activity is a minor source of local income and employment.

No impact on the distribution of the local population is anticipated as a result of implementing this alternative. However, population growth is expected to occur in the vicinity of Groveland and Big Oak Flat.

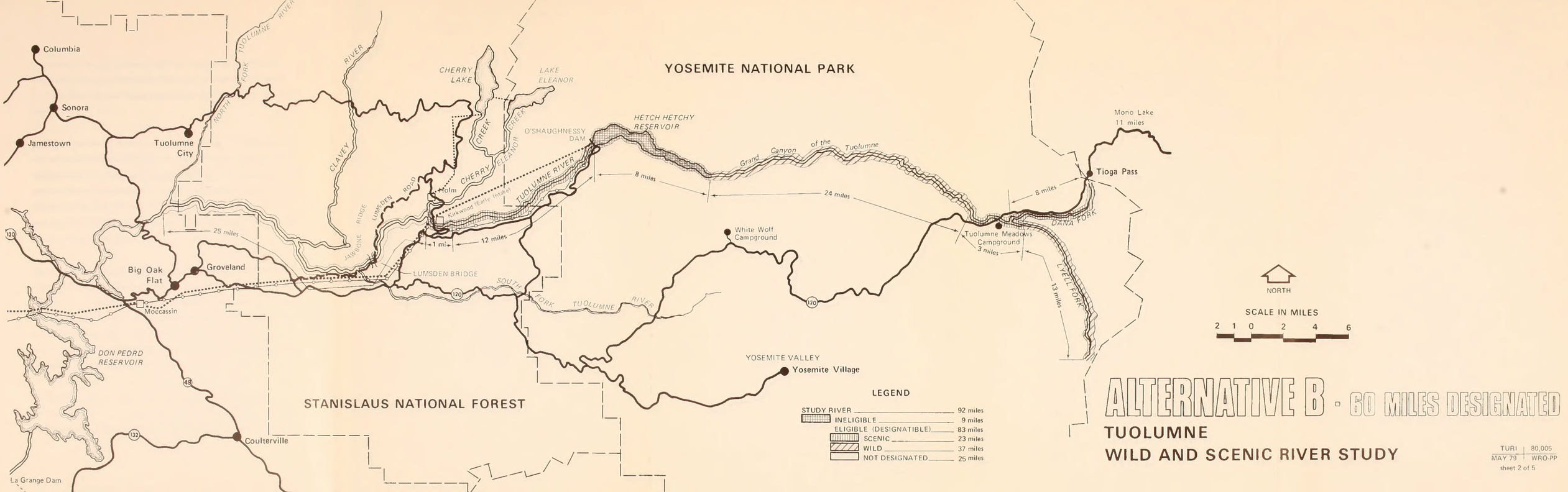
Preclusion of water resource development in the designated reaches of the Tuolumne River could result in higher costs of water and electricity if such commodities were to be developed by alternative means. Any increased electrical costs would be borne by interests outside the local area. There are no locally sponsored hydroelectric proposals; the project proposals discussed earlier have been put forth by agencies that represent the Central Valley Area and San Francisco. However, the potentially large temporary increase in local business activity during construction of the Clavey-Wards Ferry Project would be foregone if this alternative were implemented. Adequate water for Tuolumne County through 2020 has been assured through the completion of the New Melones project. The proposed water development projects would provide a potential maximum

annual water yield of 11,900 acre-feet or enough to provide domestic service to support about 25,000 people a year. If local use of this water were also assured, foregoing its use through the implementation of this option could result in increased local costs if it becomes necessary to develop a more expensive alternate water supply after 2020.

In summary, the overall impact that this would have on the local economy is considered to be of short-term duration. If the river is included within the National Wild and Scenic Rivers System, minor benefits would be accrued by local business and commercial activities, while slightly increased public service costs would be accrued by local government.

ALTERNATIVE B (DESIGNATION OF ALL ELIGIBLE SEGMENTS ABOVE EARLY INTAKE)

The alternative would designate the 60 miles of eligible segments of the Tuolumne River above Early Intake as components of the National Wild and Scenic Rivers System. All segments proposed for designation would be classified and designated the same as in Alternative A. As stated in Alternative A, the management objectives of Yosemite National Park result in the river and adjacent lands within the park being managed consistent with the intent of the Wild and Scenic Rivers Act. The environmental impacts of the management are



ALTERNATIVE B - 60 MILES DESIGNATED

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discussed in the 1978 Yosemite GMP and acompanying Environmental Statement. Thus, the following discussion of impacts will center on the 6 miles of river above Early Intake administered by the Forest Service.

Impact - With the exceptions noted below impacts of implementing this alternative are essentially the same as those resulting from implementation of Alternative A except that the undesignated eligible portions of the river would not receive the permanent protection afforded by the Wild and Scenic Rivers Act. These areas would continue to be managed under the policies of the Forest Service and Bureau of Land Management.

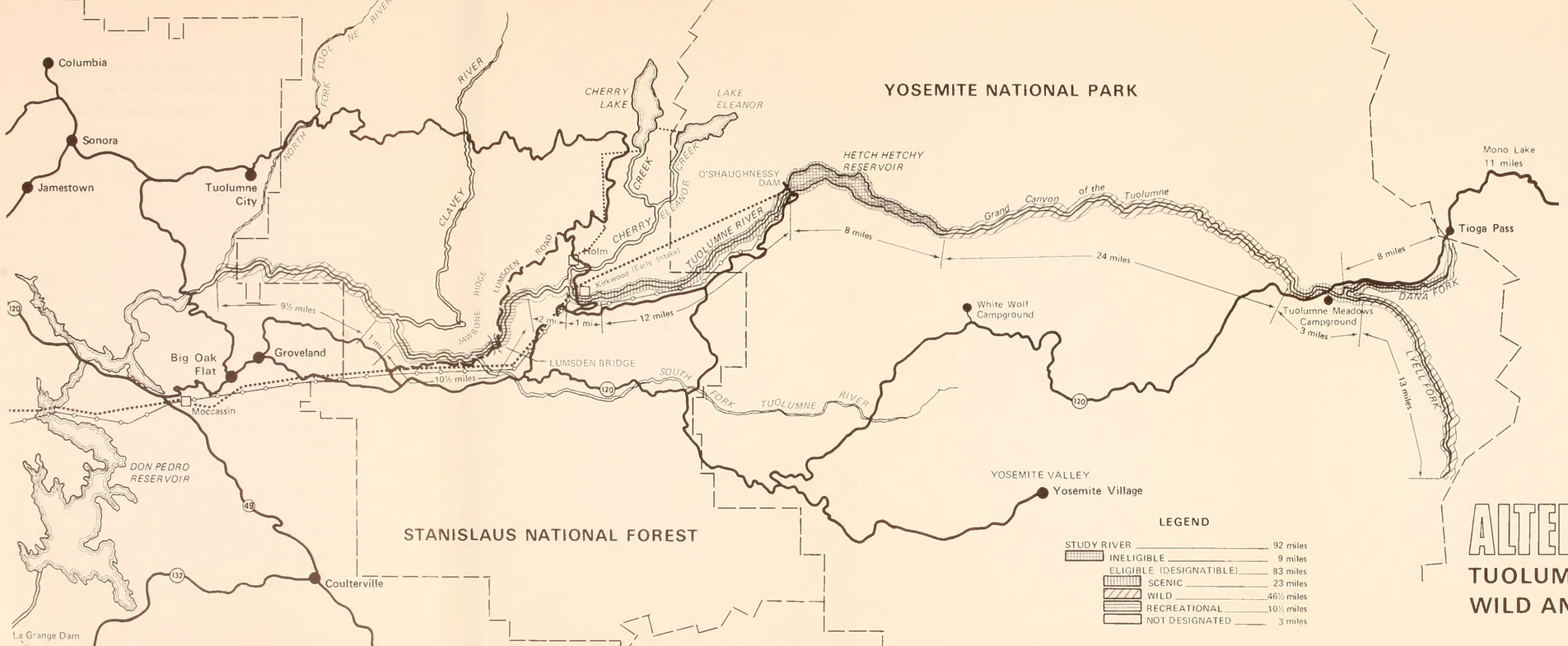
Impact on Water Resource Management and Development - Implementation of this alternative would not preclude development of water resource projects on, or affecting, the undesignated eligible segments of the river. Such developments would require permits and/or licenses from the Federal Energy Regulatory Commission, the Forest Service and Bureau of Land Management. The potential impacts of such development are covered in the discussion of Alternative E.

The eligible segment of the river from below the Early Intake excluded segment to the Clavey confluence has not been included in this alternative because impacts of the proposed Jawbone Reservoir

and appurtenant structures on river values cannot be accurately determined at this time. If this alternative were implemented and Jawbone Reservoir developed this downstream segment could be reevaluated and if found eligible could be proposed for inclusion in the National Wild and Scenic Rivers System as an extension of the Tuolumne Wild and Scenic River. Likewise if engineering and exploratory work for Jawbone were undertaken, an impact, not accurately determinable at this time, would result. If such work revealed the infeasibility of the project, and no further development work were considerd, the downstream segment could be reevaluated and if found eligible, could be proposed for inclusion in the National Wild and Scenic Rivers System as an extension of the Tuolumne Wild and Scenic River.

ALTERNATIVE C (DESIGNATION OF ALL ELIGIBLE RIVER SEGMENTS EXCEPT A 2-MILE SEGMENT BELOW EARLY INTAKE AND A 1-MILE SEGMENT AT THE CONFLUENCE WITH THE CLAVEY RIVER)

This alternative would designate all eligible segments except a 2-mile segment below Early Intake and a 1 mile segment at the Clavey River confluence and would total 80 miles. All segments proposed for designation would be classified and designated as in Alternative A. As in the previous alternatives management of lands within Yosemite National Park is consistent with the intent of the Wild and Scenic



ALTERNATIVE C · 80 MILES DESIGNATED

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Columbia
Sonora
Jamestown
Tuolumne City
Groveland
Big Oak Flat
NATIONAL FOREST

Rivers Act. Thus the following discussion of impacts will center on the 28 miles of river administered by the Forest Service and the 1 mile of river administered by the Bureau of Land Management.

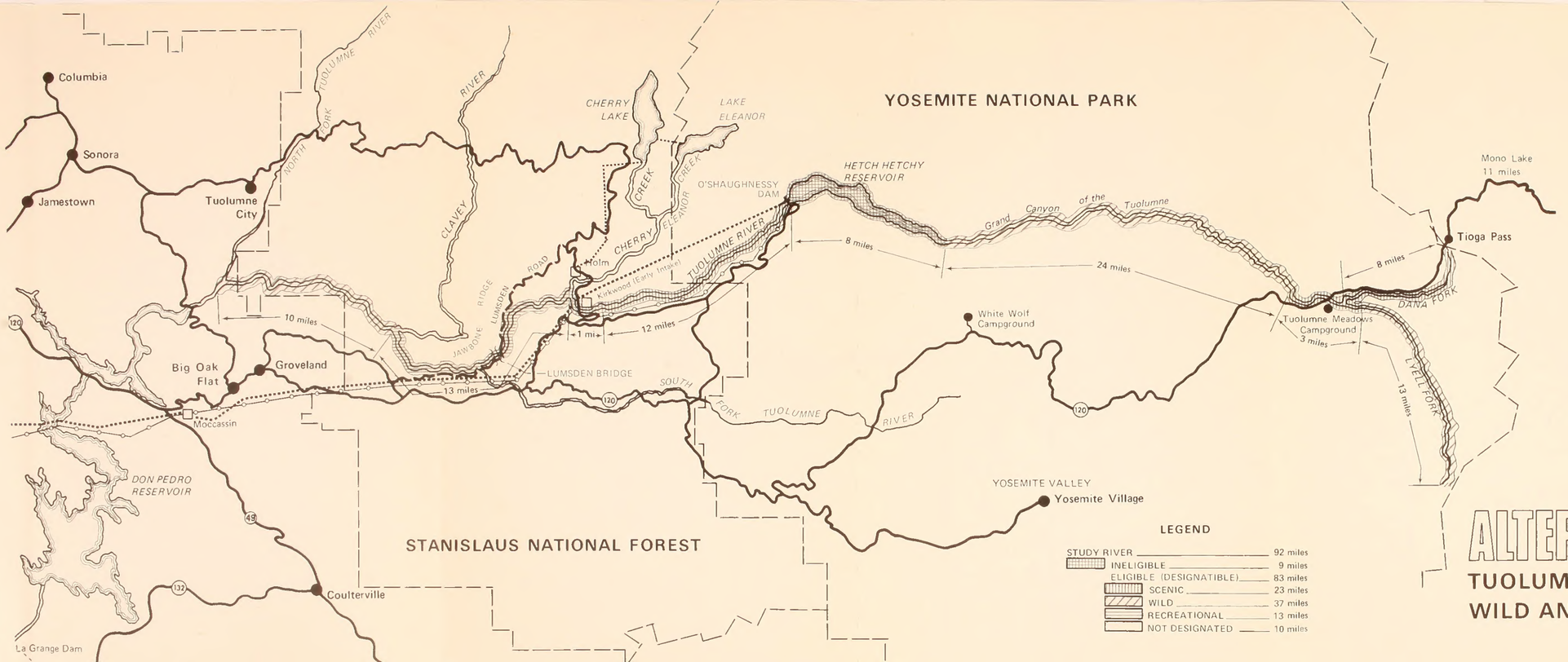
Impact - With the exception of the potential impact of water resource development proposals, the impacts of implementing this alternative are essentially the same as Alternative A except that the 3 miles of undesignated eligible portions of the river would not receive the permanent protection afforded by the Wild and Scenic Rivers Act. These areas would continue to be protected under the management policies of the Forest Service. Implementation of this alternative might preclude development of water resources on or affecting the undesignated eligible segments of the river. Such developments would require permits and/or licenses from the Federal Energy Regulatory Commisssion, and the Forest Service. However, under Section 7(a) of the Wild and Scenic Rivers Act, Public Law 90-542, the Federal Energy Regulatory Commission is prohibited from licensing the construction of water resource development project works under the Federal Power Act, as amended, on or directly affecting any river designated by the Wild and Scenic Rivers Act, as a component of the National Wild and Scenic Rivers System if such project would have a direct or adverse effect on the values for which the river was established as determined by the Secretary charged with its administration, which under this alternative would be the

Secretary of Agriculture. The potential impacts of such development are discussed under Alternative E.

ALTERNATIVE D (DESIGNATION OF THOSE ELIGIBLE SEGMENTS ABOVE THE CONFLUENCE WITH THE CLAVEY RIVER)

This alternative would designate those eligible segments totaling 73 miles above the confluence with the Clavey River as components of the National Wild and Scenic Rivers System. All segments proposed for designation would be classified and designated as in Alternative A. As in the previous alternatives management of lands within Yosemite National Park is consistent with the intent of the Wild and Scenic Rivers Act. Thus, the following discussion of impacts will center on the 19 miles of river administered by the Forest Service.

Impact - With the exception of the potential impact of water resource development proposals, the impacts of implementing this alternative are essentially the same as Alternative A except that the undesignated eligible portions of the river would not receive the permanent protection afforded by the Wild and Scenic Rivers Act. These areas would continue to be protected under the management policies of the Forest Service and Bureau of Land Management. Implementation of this alternative would not preclude development of water resource projects on, or affecting the undesignated eligible segments of the river.



ALTERNATIVE D · 73 MILES DESIGNATED

TUOLUMNE
WILD AND SCENIC RIVER STUDY

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Such developments would require permits and/or licenses from the Federal Energy Regulatory Commission, the Forest Service and Bureau of Land Management. The potential impacts of such development are discussed under Alternative E.

ALTERNATIVE E (NO DESIGNATION - NO ACTION)

Under this alternative, none of the 83 miles of eligible river would be added to the National Wild and Scenic Rivers System. The present management policies and programs of Yosemite National Park, the Bureau of Land Management (Folsom District), and the Stanislaus National Forest would continue. None of the river would be managed and protected under the Wild and Scenic Rivers Act. Present and proposed management policies of the National Park Service and the management objectives of Yosemite National Park result in 54 miles of the river and the adjacent lands within the park being administered in a manner consistent with the intent and purpose of the Wild and Scenic Rivers Act.

Lands adjacent to 14 miles of the river within the National Forest and the 1 mile on Bureau of Land Management lands are being considered as potential additions to the National Wilderness System. If this were to occur, the lands would be administered so as to protect the values in a manner consistent with the Wild and Scenic Rivers Act.

Impact - Except that it would be possible for an application to be filed for the development of a water resource project, the immediate impacts of nondesignation are essentially the same as those which would occur with implementation of Alternative A. This results from the fact that the lands adjacent to the river are in public ownership, have little potential for commercial timber production or grazing, are, or have the potential for, being managed for preservation purposes, and there is little potential for significant increases in recreation use.

Hydroelectric development on the lower portion of the Tuolumne River is a distinct future possibility. A specific project has been proposed by the Modesto and Turlock Irrigation Districts and the city and county of San Francisco.

The proposed project has been described in an appraisal report prepared by R. W. Beck and Associates, consultants to project sponsors, and entitled "Hetch Hetchy Water and Power System, Stage 1 Additions, Tuolumne County, California." The project consists of two units, the Clavey unit and the Wards Ferry unit.

The Clavey unit includes Jawbone diversion dam and reservoir on the Tuolumne one-half mile downstream from the Cherry Creek confluence, a water conveyance tunnel through Jawbone Ridge connecting to the

NORTH

SCALE IN MILES

2 1 0 2 4 6

ALTERNATIVE E - NO DESIGNATION (NO ACTION)

SHOWING POTENTIAL CLAVEY-WARDS FERRY PROJECT

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Clavey reregulating reservoir on the Clavey River, and a conduit from the Clavey Reservoir to the Clavey powerhouse located near the Clavey-Tuolumne confluence. Water would be returned to the Tuolumne at a point below the Clavey confluence at the high-water elevation of the proposed Wards Ferry Reservoir.

The Clavey unit is basically a single-purpose power production proposal. The installed generating capacity for this unit would be 300 Million Kilowatts. The average annual generation under projected flow conditions would be 708 million kilowatt hours. The Clavey Unit would provide no additional water yield.

The Wards Ferry unit consists of Wards Ferry dam, Wards Ferry reservoir, and powerhouse. The proposed dam would be located at the headwaters of the existing Don Pedro Reservoir. The proposal recommends underground placement of the powerhouse near the north side of the dam structure. The proposed Wards Ferry Reservoir would have a surface area of 1,120 acres. The reservoir would be a long, narrow impoundment located between steep canyon walls. At its widest section, it would average about 1,000 feet; and it would be approximately 10 miles in length from the dam to headwaters. The installed generating capacity for Wards Ferry Unit would be 100 Million Kilowatts. Projections indicate an average annual generation of 315 kilowatt hours. Potential annual firm water yield from the proposed Wards Ferry Reservoir would be approximately 11,900 acre-feet.

Since the planning for the hydroelectric power project is in the preliminary stages, this report cannot provide a detailed analysis of the impacts which would result from project construction. The proposed developments would need the approval of the Federal Energy Regulatory Commission (FERC) and the Secretaries of the Interior and Agriculture before actual construction could proceed. A preliminary permit from the Federal Energy Regulatory Commission has been requested by the project sponsors. A complete and detailed accounting of the environmental impacts of the project would be required at the time that the decision is made to proceed toward construction. Consequently, only the obvious major environmental impacts which could result are considered herein.

Impact On Recreation - If the project were constructed, the 18-mile whitewater boating run from Lumsden to Wards Ferry Bridge would be nearly eliminated. This whitewater section is used by more than 6,500 commercial and private rafters and kayakers each year. As indicated earlier, this whitewater reach is considered to be one of the finest continuous whitewater runs in the Nation. The Clavey unit would deplete the flows in the upstream end of the run throughout most of the recreation season. The Wards Ferry unit would inundate the river from Wards Ferry Dam to the Clavey Powerhouse.

The proposed Wards Ferry Reservoir would be located in a long, narrow canyon with precipitous banks and difficult access. Considerably better opportunity for flatwater recreation exists at currently undeveloped sites on larger reservoirs nearby. Lack of full development at reservoirs under Federal administration, in general, has resulted from unwillingness by local public entities to sponsor and share in the costs of recreation development with the Federal Government under provisions of Public Law 89-72, the Federal Water Project Recreation Act. Lack of full development at privately owned and nonfederal reservoirs is generally attributed to insufficient recreation funds available at this time for recreation development.

Recreation development at the Wards Ferry project would be a responsibility of the utility under the Federal Energy Regulatory Commission (FERC) licensing requirements. Applicants for license of hydroelectric power generating projects are required to prepare a recreation plan (Exhibit R) as a part of their application to FERC. In general the recreation plan is to provide for full public utilization of project lands and waters for recreation.

Impact On Scenic Quality - The considerable road building, dam construction, borrow pits, transmission facilities, switchyards, and related structures, would produce impacts both of a short-term and a long-term nature, and would constitute a significant detraction from

the natural scene. This is particularly true for the present roadless area of the lower canyon where the Wards Ferry Dam and Reservoir, Clavey Powerhouse, transmission lines, and switchyards would be located.

Impact on Water Resources Management and Development - Construction of the proposed project would not necessarily foreclose other water resource management and development opportunities relative to the Tuolumne River.

Impact On Fish and Wildlife - At present, the Tuolumne River from the Cherry Creek confluence to Don Pedro Reservoir is considered one of the finest cold water trout fisheries in California. The river is highly productive, yielding numerous fish, many of which are trophy-sized. If the river were given no protection and the proposed projects were implemented, the entire river section would be adversely impacted. The Clavey unit, as proposed, would reduce the outflow at the Jawbone Diversion Dam site to the 35-75 cfs levels similar to those that have historically been released at O'Shaughnessy Dam. An interagency flow study by the U.S. Fish and Wildlife Service states that the present releases at O'Shaughnessy are inadequate to maintain a prime fishery in the upper river between the dam and Early Intake. Similar flow releases below Jawbone

Diversion Dam would be even more inadequate for the larger channel in that part of the river between the dam and the Clavey confluence.

The fishery would be further impacted by the construction of the Wards Ferry Unit. The Wards Ferry Reservoir would convert the Tuolumne from the Clavey confluence to the existing Don Pedro Reservoir into a reservoir fishery and would eliminate existing trout spawning beds. Reservoir fisheries are in abundance in the Sierra foothills, whereas river trout fisheries of the quality of the Tuolumne are a rarity in the entire state.

In addition to impacting the Tuolumne River, the project would also impact the fisheries of the Clavey River and Don Pedro Reservoir. The Clavey fishery would be adversely impacted by the proposed Clavey Reservoir and the projected low-flow releases. The Wards Ferry Dam would block the spawning runs necessary to perpetuate the trout fishery in Don Pedro Reservoir. No hatcheries or mitigating measures have been provided in the project proposals. The California Department of Fish and Game has estimated that increased diversions on the Tuolumne may result in complete elimination of salmon from the river.

Wildlife, particularly deer, would be impacted by the loss of riparian habitat within the proposed reservoir areas and the obstruction of normal migratory routes.

Impact on Transportation - There is no identifiable impact on transportation which would result from construction of the project.

Impacts on Mining - Mining activity within the study area consists mainly of gold mining within the last three miles of the study corridor above Don Pedro Reservoir. This mining, mainly by individuals with relatively small recreation-type operations, would be precluded on reaches inundated by the Wards Ferry and Jawbone Diversion dams.

Impact on Soils and Vegetation - Fluctuation in the elevation of project reservoir waters either seasonably or as a result of project operation could erode the soils of the shorelines. This could be detrimental to shoreline vegetation. Vegetation below the reservoir surface elevations, an area of about 1,500 acres, would be eliminated. Vegetation and soils at sites developed for project operation and maintenance would be modified and adversely impacted.

Impact on Grazing - Grazing would be minimally affected by the loss of a small amount of grasslands within the proposed area inundated by Wards Ferry Reservoir.

Impact On Air And Water Quality - Construction of the project would cause certain short-term disturbances to air and water quality during the construction process. Proposals are not detailed enough to

determine mitigative measures that could be used during this process. The long-term effects on air quality would be minimal. Water quality would be impacted by warming trends induced by low-flow releases during summer months.

Impacts on Historical and Archeological Sites - In the lower 18 miles of the study reach, over 10 miles of which would be impacted by the proposed Wards Ferry Reservoir, there are 12 prehistoric sites and 11 historic features. An extensive investigation of water development sites could result in additional archeological and historical findings. The zone of the Tuolumne River between Hetch Hetchy and Wards Ferry is the only remaining part of the river reasonably undisturbed and represents the most complete remnant of the once extensive cultural record of the Central Sierra Miwok and their ancestors. Authorization of the Clavey-Wards Ferry Project would require a detailed inventory of the cultural resource values that would be impacted by the project. A plan for the recovery of those resources would be required.

Impact on Land Ownership - Construction would result in a significant part of the 149 acres of river associated private lands being inundated. Other lands impacted by impoundments and/or other development related to the operation and maintenance of the project would be Federal lands administered by the Forest Service and the

Bureau of Land Management. Approximately 1,500 acres of Federal lands would be directly impacted.

Impacts on the Economy - Based upon information from the Federal Energy Regulatory Commission and from project proponents, the impact on the regional and national economy would be substantial. Production of an equal amount of electricity by a composite of coal, oil, and nuclear methods would cost an estimated $17 million more annually (measured in 1979 dollars) than would the Clavey-Wards Ferry Project.

The entire stretch of the Tuolumne River which would be affected by the proposed hydroelectric developments lies within Tuolumne County. Hydroelectric development on the lower section of the Tuolumne River would eliminate the existing commercial rafting industry currently operating there with annual gross revenues of about $210,000. The industry might be able to recover these losses partially by relocating operations to other rivers, but it is doubtful that the extent of recovery would be significant. The income and employment currently generated by this industry would be irrevocably lost to Tuolumne County.

While the initial economic impacts on Tuolumne County would be favorable, the sudden inflation of the demand on local government for schools, law enforcement, sanitation, and other essential

services, with an equally sudden deflation of this demand when the project is completed, could have disruptive effects on the local economy.

The local area could realize moderate long-term economic benefits if it were assured use of a portion of the 11,900 acre-feet maximum annual water yield expected from the proposed development that would be available to it at a lesser price than the cost of developing alternative supplies. No such assurance exists at this time.

In summary, the overall economic impact of implementing the development proposals would consist of significant short-term benefits accrued by local business, with service costs accrued by local government. This would occur as a result of the infusion of temporary construction jobs into the local economy. The long-term impact of the proposed developments would be the permanent loss of the Tuolumne River commercial rafting industry. This loss would be partially offset by a small increase in utility industry employment and an increase in property tax revenues. The long-term beneficial effect on regional and national economies would be significant and of far greater proportions than either the short- or long-term impacts at the local level.

Irreversible or Irretrievable Commitment of Resources - With the exception of Alternative E (No Action) with the likely construction of the Clavey-Wards Ferry Project there would be no irretrievable or irreversible commitment of resources among the alternate plans. Construction of the project would commit those lands and waters and other resources required for the development, maintenance and operation of the Clavey-Wards Ferry project for at least the term of the project license and probably the life of the project neither of which have been determined but which would probably exceed 50 years.

V. EVALUATION OF ALTERNATIVES UNDER PRINCIPLES AND STANDARDS

The Water Resources Council in 1973 promulgated the final set of "Principles and Standards For Planning Water and Related Land Resources." Later that same year, they were approved by the President and became effective. As mentioned in the previous chapter, in order to help in assessing the effects of alternative plans, the Principles and Standards call for the display of four accounts: (1) national economic development, (2) regional development, (3) environmental quality, and (4) social well-being. The purpose of the accounts is to show, in a clear and concise way, the expected results of the alternatives, so they may be easily compared with one another.

The Principles and Standards recognize that all effects of alternatives cannot be quantified or converted into monetary terms. Those effects that can be readily converted into monetary terms are displayed in the national economic development account and in the income portion of the regional development account. Those effects that are best described in nonmonetary terms are displayed in the environmental quality and the social well-being accounts and in portions of the regional development account. These accounts are displayed in the four tables that follow.

National Economic Development (Table VI-1) - The national economic development account is designed to measure the net effect of each alternative on national income. Net effects are computed by subtracting the value of resources required by a plan (the costs) from the value of output of goods and services resulting from a plan. All changes in value are measured against future conditions expected if current management direction were to continue.

Projected water and power values from hydroelectric development are based on preliminary estimates obtained from Clavey-Wards Ferry project proponents and data obtained from FERC. Hydropower value to users is approximated by taking account of the cost of power from the most likely alternative source and using this as the measure of the value of the power creditable to the plan. The alternative selected must be a viable one in terms of engineering. The costs should include any required provisions for protection of the environment. The national economic development values indicated by this analysis, (see following table) are lower than those indicated by analyses prepared by project proponents, the California Department of Water Resources, and the Sierra Club primarily because 1979, rather than projected 1980-85, price-cost relationships are used.

In production of power, the Clavey unit would be much more efficient than the Wards Ferry unit. Moreover, development of the Clavey unit,

could mean a net benefit of $17 million to the national economy based on approximated project costs. Hydroelectric developments in addition to the proposed Clavey and Wards Ferry projects are possible under Alternative E, the no action alternative, but lack of any project data prevents reflecting this potential in the accounts.

Effects on recreational values are based on recreational cost and visitor-day estimates developed by Stanislaus National Forest personnel. Values per recreation day were estimated in accordance with valuation standards recommended by the U.S. Water Resources Council.

Capital costs for recreational development by the Federal Government were amortized at the Water Resources Council interest rate (6 7/8 percent over project life) in order to obtain average annual values. Capital costs for recreation and hydroelectric development by proponents were amortized at 7 percent interest, this amount being the estimated cost to the project proponents of raising capital through the sale of tax-exempt bonds. The project period used for both sets of costs was the same.

Under Alternative A, national economic development benefits would not accrue in the short term as hydroelectric development would be deferred to the future. Because recreation use in the river corridor

is near capacity under present management, a large increase in recreation use is not expected. The increased cost of protecting the river corridor from environmental degradation is expected to exceed the monetary value of any increased recreation use by $70,000 annually under Alternative A.

Regional Development (VI-2) - The regional development account is intended to measure the net effect of each alternative on regional and local income, employment, and pattern of economic activity. Effects on net income are expected to be dispersed through California, while effects on employment and economic growth are expected to be concentrated in Tuolumne County.

Changes in net income were estimated in the same manner as for the national economic development account. This account shows how income effects are distributed between California and the rest of the nation. Employment effects were roughly estimated from readily available data (actual employment effects could vary significantly from estimates shown in Table VI-2 depending on project construction methods and scheduling). Effects on the pattern of economic activity indicated in the table are typical of large construction projects in rural areas: A rapid business expansion during construction is usually followed by a sharp contraction when construction is completed.

Alternative A is not expected to have significant effects on employment or economic stability in Tuolumne County. Nearly all of the increased recreation use is expected to be by California residents, while the cost of providing additional protection for the river corridor would be borne by the Federal Government. As a result, California is expected to experience a slight increase in net income from Alternative A, while the rest of the nation is expected to experience a slight decrease.

Environmental Quality (Table VI-3) - The environmental quality account is intended to measure the effects of each alternative on the environmental characteristics of the study river. The figures in the "Project Development" category of the chart reflect only the Clavey-Wards Ferry project. However, there is a possibility that, under Alternatives B and E, development of projects in addition to Clavey-Wards Ferry (i.e., dams, powerhouses, and so forth) could occur.

Alternative E could result in significant adverse environmental effects in the river corridor. Alternative A would preserve the existing environmental conditions and, in so doing, provide maximum protection to the environmental quality of the river.

Social Well-being - The social well-being account is intended to measure the effects of each alternative on educational, cultural,

and recreational opportunities; standard of living; health and safety; emergency preparedness; and real income distribution.

The Clavey and Wards Ferry units would inundate inventoried Indian archeological sites and artifacts. Recreational activities, especially whitewater boating, would be affected if not eliminated by the project.

For purposes of comparison, oil consumption equivalents to hydropower development have been estimated by the FERC.

Alternative A, [redacted], would generate some additional recreation opportunities, and prevent the inundation of Indian artifacts. Alternatives B, C, D, and E would generate a different mix of recreation opportunities. These alternatives, however, through water resource development could potentially provide a source of funding for social services and could potentially reduce dependence on imported energy.

TABLE VI-I

National Economic Development Account
Potential Average Annual Effects on National Income
(All figures given in 1979 dollars)

	ALTERNATIVE A (83 Miles Designated)	ALTERNATIVE B (60 Miles Designated)	ALTERNATIVE C (80 Miles Designated)	ALTERNATIVE D (73 Miles Designated)	ALTERNATIVE E (No Designation)
HYDROELECTRIC DEVELOPMENT					
Beneficial Effects (Cost of Alternative Sources)					
Value of Electric Power Produced	-----	$37,700,000	$30,000,000	$7,700,000	$37,700,000
Value of Water Supply Created	-----	900,000	-----	900,000	900,000
Subtotal		38,600,000	30,000,000	8,600,000	38,600,000
Adverse Effects (Costs of Clavey-Wards Ferry Project)	-----	20,900,000	13,000,000	7,900,000	20,900,000
Net Effects	-----	17,700,000	17,000,000	700,000	17,700,000
RECREATION					
Beneficial Effects					
Whitewater Boating	-----	-93,000	39,000	-120,000	-93,000
Flatwater Boating	-----	3,000	-----	3,000	3,000
Stream Fishing	$11,000	-10,000	-5,000	-1,000	-10,000
Reservoir Fishing	-----	8,000	-----	8,000	8,000
Camping	12,000	13,000	7,000	14,000	13,000
Other	5,000	9,000	8,000	6,000	9,000
Subtotal	28,000	-70,000	49,000	-90,000	-70,000
Adverse Effects					
Costs of Recreation Facilities	98,000	191,000	111,000	185,000	191,000
Net Adverse Effects	70,000	-261,000	-62,000	-275,000	-261,000
TOTAL EFFECTS					
Beneficial Effects	28,000	38,530,000	30,049,000	8,510,000	38,530,000
Adverse Effects	98,000	21,091,000	13,111,000	8,085,000	21,091,000
Net Effects	$-70,000	$17,439,000	$16,938,000	$425,000	$17,439,000

TABLE VI-2

Regional Development Account
Potential Effects on Regional Income, Employment, and Economic Stability
(All dollar figures based on 1979 values)

	ALTERNATIVE A (83 Miles Designated)	ALTERNATIVE B (60 Miles Designated)	ALTERNATIVE C (80 Miles Designated)	ALTERNATIVE D (73 Miles Designated)	ALTERNATIVE E (No Designation)
ANNUAL INCOME, TOTAL NATION *					
Beneficial Effects	$28,000	$38,530,000	$30,049,000	$8,510,000	$38,530,000
Adverse Effects	98,000	21,091,000	13,111,000	8,085,000	21,091,000
Net Effects	-70,000	17,439,000	16,938,000	425,000	17,439,000
ANNUAL INCOME, CALIFORNIA					
Beneficial Effects	25,000	38,537,000	30,044,000	8,519,000	38,537,000
Adverse Effects	10,000	21,091,000	13,111,000	8,085,000	21,091,000
Net Effects	15,000	17,446,000	16,933,000	434,000	17,446,000
ANNUAL INCOME, REST OF NATION					
Beneficial Effects	3,000	-7,000	5,000	-9,000	-7,000
Adverse Effects	88,000	---	---	---	---
Net Effects	-85,000	-7,000	5,000	-9,000	-7,000
EMPLOYMENT IN TUOLUMNE COUNTY					
Temporary Construction Jobs		1,000	600	400	1,000
Permanent Utility Industry Jobs		10	6	4	10
Seasonal Rafting Industry Jobs		-50	21	-65	-50
Economic Stability in Tuolumne County	No change	Expansion, then Contraction	Expansion, then Contraction	Expansion, then Contraction	Expansion, then Contraction

* All figures here relate to NED account, TOTAL EFFECTS

TABLE VI-3

Environmental Quality Account

	ALTERNATIVE A (83 Miles Designated)	ALTERNATIVE B (60 Miles Designated)	ALTERNATIVE C (80 Miles Designated)	ALTERNATIVE D (73 Miles Designated)	ALTERNATIVE E (No Designation)
ADVERSE EFFECTS RESULTING FROM CONSTRUCTION OF CLAVEY-WARDS FERRY PROJECT					
Number of Dams		3	2	1	3
Number of Powerhouses		2	1	1	2
Miles of Tunnel		8.2	8.2		8.2
Miles of Access Road		7.4	6.4	1	7.4
Miles of Aerial Transmission Line		48.6	42.6	34.6	48.6
Number of River Bridges		1	1		1
RECREATIONAL RESOURCES					
Acres of Usable Flatwater		1,204		1,204	1,204
Miles of Fishable Stream					
-with reduced quality of the fishery		14	14		14
-eliminated		11		11	11
MILES OF USEABLE WHITEWATER					
-with reduced quality of the recreational experience		7	7		7
-eliminated		11		11	11
CULTURAL RESOURCES					
Indian Archeological Sites		Inundated	Inundated	Inundated	Inundated
VISUAL RESOURCE					
River Naturalness		Impaired	Impaired	Impaired	Impaired

TABLE VI-3 (Continued)

Environmental Quality Account

	ALTERNATIVE A (83 Miles Designated)	ALTERNATIVE B (60 Miles Designated)	ALTERNATIVE C (80 Miles Designated)	ALTERNATIVE D (73 Miles Designated)	ALTERNATIVE E (No Designation)
BIOLOGICAL RESOURCE					
Habitat for rare and endangered species		Diminished		Diminished	Diminished
MILES PRESERVED AND PROTECTED BY DESIGNATION					
Wild river classification	47	37	46.5	37	
Scenic river classification	23	23	23	23	
Recreational river classification	13		10.5	13	
Total miles classified and designated	83	60	80	73	

TABLE VI-4

Social Well-Being Account

	ALTERNATIVE A (83 Miles Designated)	ALTERNATIVE B (60 Miles Designated)	ALTERNATIVE C (80 Miles Designated)	ALTERNATIVE D (73 Miles Designated)	ALTERNATIVE E (No Designation)
EDUCATION AND CULTURAL					
Opportunities at Indian Sites		Inundated	Inundated	Inundated	Inundated
RECREATIONAL OPPORTUNITIES					
Recreation days/year					
Whitewater boating		-6,200	2,600	-8,000	-6,200
Flatwater boating		1,600		1,600	1,600
Stream fishing	2,200	-2,100	-1,000	-200	-2,100
Reservoir fishing		4,000		4,000	4,000
Camping	6,000	6,300	3,500	6,800	6,300
Other	2,300	4,700	4,200	2,900	4,700
Total net increase in all recreation opportunities	10,500	8,300	9,300	7,100	8,300
QUALITY OF LIFE, HEALTH, SAFETY					
Net revenue for project proponents (Net of adverse and beneficial effects in NED account)		17,700,000	17,000,000	700,000	17,700,000
Additional water supply created by construction Clavey-Wards Ferry (in acre feet)		11,900		11,900	11,900
Net power generation * (million kilowatt hours per year)		927.6	639.2	288.4	927.6

* Figures include potential reductions in Hetch Hetchy System outputs.

TABLE VI-4 (Continued)

Social Well-Being Account

	ALTERNATIVE A (83 Miles Designated)	ALTERNATIVE B (60 Miles Designated)	ALTERNATIVE C (80 Miles Designated)	ALTERNATIVE D (73 Miles Designated)	ALTERNATIVE E (No Designation)
EMERGENCY PREPAREDNESS					
Potential reduction in imported oil (energy equivalent, barrels/year)		1,500,000	1,000,000	500,000	1,500,000
Income Distribution	None of the alternatives are expected to cause a major redistribution of income among income classes. However, benefits will be accrued primarily by people of middle or upper-middle class income.				

VI. THE PREFERRED ALTERNATIVE

Examination of the economic effects of the identified alternatives reveals the following: In terms of national economic development, three of the five alternatives (B, C, and E) could provide or have the potential for providing approximately the same net economic benefits. Alternatives B and E and possibly C allow for the utilization of the Tuolumne River to provide increased economic benefits and outputs related to hydroelectric development. Alternative A provides for preservation of environmental quality. Except as provided for in current or future Forest Service and Bureau of Land Management plans and policies, Alternative E would provide no statutory protection for the Tuolumne River under the Wild and Scenic Rivers Act. Alternative D, while providing for protection of significant portions of eligible river through designation could provide substantial economic benefit by allowing for the future development of resources downstream from the Clavey confluence. Alternative B, in contrast to D, provides less protection of the river in terms of miles designated but by allowing development of resources downstream from Early Intake could provide substantially higher future economic development benefits. Lastly, Alternative A provides for no significant increase in net economic benefits related to hydroelectric development. Economic benefits potentially realizable under other alternatives through water resource development, however, would not be foregone by implementation of

Alternatives A and C. These benefits would be deferred to a future when if necessary, through action by Congress water resource development for hydropower could be allowed.

The environmental effects of the alternatives include the following: Alternative A would preserve and protect the cultural, archeological and wild and scenic river values of the 30-mile portion of the Tuolumne River downstream from Yosemite National Park. Alternative C could have the same environmental effects as Alternative A except that the two eligible but undesignated segments totaling 3 miles would continue to be under existing Forest Service management policies and would not be protected by the Wild and Scenic Rivers Act. Alternatives B and D would provide protection to portions of the river, while allowing for partial future utilization of the river resources for increased economic benefits and output. (The possible future benefits and output of D are less than those of B.) Alternative E, no action, considers as one likely future use of the Tuolumne River resource the development of both the Wards Ferry and the Clavey hydroelectric projects. These two projects would develop nearly all of the remaining hydroelectric potential of this portion of the river. As already mentioned, Alternative E provides no additional statutory protection of the Tuolumne's wild and scenic river values. Alternative A would not allow any additional hydroelectric development on the river without express authorization by Congress.

Any economic development benefits associated with Alternatives B, D, and E, and possibly C, could be realized only with significant environmental losses as discussed in the foregoing section.

Obviously there are significant tradeoffs involved in the selection of an alternative. Alternatives B, C, D, and E, have the potential to fulfill a mix of objectives - both environmental quality and economic development - whereas Alternative A would essentially fulfill one objective, environmental quality.

As provided in Principles and Standards (page 107):

> A recommended plan must have net national economic development benefits unless the deficiency in net benefits for the national economic development objective is the result of benefits foregone or additional costs incurred to serve the environmental quality objective. In such cases, a plan with a less than unity benefit-cost balance may be recommended as long as the net deficit does not exceed the benefits foregone and the additional costs incurred for the environmental quality objective.

In this instance, Alternative A which best meets the environmental quality results in a net deficit of $70,000. However, this amount does not exceed the benefits foregone and the additional costs incurred for meeting the environmental quality objective. Alternative A preserves 83 miles of free-flowing stream including stretches of some of the finest whitewater in California and the Nation; and preserves an estimated 250 archeological sites associated with

the Miwok Indians. These sites are especially important to the interpretation of the Miwok heritage with the loss through inundation of the sites in much of the Stanislaus River Canyon. Preservation of the river corridor would also protect the significant fishery resources and provide opportunity to interpret the early history of the area including that of the gold rush era.

VII. CONSULTATION WITH OTHERS

Public Participation

From initial formation of the Tuolumne River Wild and Scenic Study team in September 1975, priority has been given to public involvement in all study phases. This involvement includes identification of issues, conflicts and viable alternative river uses. Since the establishment of a central office for the study on the Stanislaus National Forest, about 5,000 study brochures have been distributed. In October 1975, informational meetings were conducted in Sonora, Modesto, and Oakland, California. Attendance at the meetings exceeded 500 persons. Public input from these meetings was summarized and compiled into an 80 page document utilized by the study team in defining study issues. In April 1976, the study team held workshops in Sonora, Modesto, and Oakland to give the public the opportunity to write out, using a prepared workbook, what future uses they would like to see on the Tuolumne River. The public responded with the return of some 800 completed workbooks. Analysis of these workbooks helped shape the alternatives to be identified by the study team in the report. To date, more than 2,700 letters have been received from 45 states as well as 8 foreign countries.

Another expression of public attitude on future use of the Tuolumne occurred in November 1978, when the Tuolumne County Board of Supervisors placed an advisory measure on the County ballot.

The measure read as follows: "Shall the Turlock Irrigation District, Modesto Irrigation District and the City and County of San Francisco dam projects be constructed on the Tuolumne River?" Election returns showed the voters reponded to the measure with a two to one "no" vote (7,009 to 3,508).

Throughout the study process, coordinating meetings have been held and general progress reports given to the local and regional municipalities, government agencies, special interest groups, schools and colleges. With distribution of this draft document, a series of four public hearings will be held in Sonora, Modesto, Oakland and San Francisco midway during the 90 day review process. Testimony given and written comments received during the public review will be utilized in identification of a study report recommendation.

Cooperative Agencies
Federal, State, and Local

Federal Agencies

Federal Energy Administration
Federal Energy Regulatory Commission
Interagency Whitewater Committee
United States Department of Agriculture
  Forest Service
United States Department of Commerce
  National Oceanic and Atmospheric Administration
United States Department of Defense
  Army Corps of Engineers, Sacramento
  Coast Guard
United States Department of the Interior
  Bureau of Indian Affairs
  Bureau of Land Management
  Bureau of Mines
  Fish and Wildlife Service
  Geological Survey, Conservation Division
  Heritage Conservation and Recreation Service
  National Park Service
  Nuclear Regulatory Commission
United States Department of Transportation
  Federal Highway Administration, Region Nine

California State Agencies

Air Resources Control Board
Central Valley Regional Water Quality Board
Department of Fish and Game
Department of Justice
Department of Navigation and Ocean Development
Department of Parks and Recreation
Department of Water Resources
Office of the Governor, Office of Planning and Research, State Clearinghouse
Public Utilities Commission
The Reclamation Board
Water Resources Association
Water Resource Control Board

Tuolumne County Agencies

Board of Supervisors
Chamber of Commerce
Citizens Committee Water Study

Tuolumne County Agencies (Continued)

Farm Bureau
Historical Society
Planning Department
Tuolumne Indian Tribal Council
Water District No. 1
Water District No. 2

Other Agencies or Bureaus - California

Central Sierra Economic Development District
City and County of San Francisco
Groveland Community Services District
Modesto Irrigation District
Turlock Irrigation District

Special Interest and Other Cooperative Groups

American Federation of State, County, and Municipal Employees
American Rivers Conservation Council
Audubon Canyon Ranch
Bushwhacker Backpacking Supply
California Mining Journal
California State Horsemen's Association
California Trout, Keeper of the Streams
Citizens to Preserve the Tuolumne
Coalition to Restore Hetch Hetchy
Colorado Whitewater Association
Community Action Project
Conservation Law Society of America
California Wilderness Coalition
Delta Ecology Club
Diablo Valley Fly Fishermen
Echo
Ecology Center
Ecology Information Center
Environmental Center of San Luis Obispo County
Experimental Science and Research Association
Federation of Fly Fishermen
Field and Streams Magazine
Four Tomorrow, Inc.
Friends of the Earth, Inc.
Friends of the River
Friends of the Tuolumne
Golden Gate Angling and Casting Club
Izaak Walton League of America, Inc.
Mok:Mak River Expeditions

Special Interest and Other Cooperating Groups (Continued)

Mountain Affair Mountaineering
National Friends of the River, Inc.
National Parks and Conservation Association
Northcoast Environmental Center
Oregon University Rights to Rivers
Pacific Center of Western Studies
Pacific Rivers Outfitters Association
Pine Mountain Lake Association
Project Survival
R. W. Beck and Associates
San Luis Rey Equine Clinic, Inc.
Sierra Mac River Trips
The Sierra Club
San Francisco Bay Chapter, River Touring Section
Tuolumne Wild River Association
Yosemite Task Force
Sonora Pass Vacationland
S.P.E.
Stanislaus Fly Fishermen
Tuolumne River Expeditions
University of California, Davis
University of California, San Francisco
University of Nevada
University of Washington
Western Mining Council
Western River Guides Association, Inc.
Whitewater Expeditions/Exploration, Ltd.
Whitewater Mitigation Committee
Wilderness World
Winnebago International Travelers

II. GLOSSARY

Acre-foot - the volume of water that would cover one acre to the depth of one foot.

Alluvium - clay, silt, sand, or other material deposited by running water.

Chaparral - a semi-arid vegetative zone consisting of low oaks and generally thick brush.

Conduit - a natural or artificial channel used to convey water.

Confluence - the place of meeting of two streams.

Controlled flow - a required minimum flow release from a dam or reservoir.

Diversion dam - a usually small dam in a streamcourse used to collect water for conveyance to a powerhouse or other use.

Flatwater recreation - recreation associated with still water, such as sailing, motorboating, water skiing and swimming.

Penstock - a conduit or pipe for conducting water.

Potable - suitable for drinking.

Recreation day - a visit by one individual to a recreation development or area for recreational purposes for all or any reasonable portion of a 24-hour period.

Riparian - relative to or living on a bank of a natural watercourse.

Riprap - a foundation or retaining wall of loose stone.

Runoff - the water from rain or melted snow which reaches streams.

Tailrace - a channel through which water flows upon leaving a powerhouse.

Visitor day - one forest visitor per twelve-hour period.

Whitewater recreation - recreation associated with moving water, such as river rafting and kayaking.

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X. APPENDIX

The appendix consists of a two-volume Technical Data inventory containing the studies and reports which support the Tuolumne River Wild and Scenic River study. The Technical Data Inventory, which exceeds 900 pages, is available for review at the following location: Stanislaus National Forest, 19777 Greenley Road, Sonora, California 95370.

MAILING LIST FOR DRAFT REPORT

TUOLUMNE RIVER WILD & SCENIC STUDY

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Holloway, Leland
Holmstrom, Mary D.
Holsey, Harlan
Holt, Henry D.
Hall, Deane
Hoachlandes, Gary
Harrington, Thomas E.
Haynes, Al
Hubbard, Heather J.
Harp, Candy
Heintzelman, Mark D.
Handschin, Walt

Harris, Teresa
Harris, Barbara
Hathaway, Pete
Haldorsen, Tom
Hammer, Douglas L.
Hanna, Bill
Hansen, Pauline
Harper, Wade
Harrington, Thomas E.
Hein, Kirk
Hauck, Roanal
Hauser, Delvina
Havan, Stephen
Haack, Warren
Hall, Kevin
Handy, George & Elsie
Hansen, Kevin
Harmer, David
Harper, Joyce
Haughey, Vincent J.
Hulfgren, Kathleen
Heath, Roberta B.
Hedges, Pamela
Hegbee, Garry
Hendrickson, Doug
Hackamack, Pearl
Haddeland, George
Hagan, Gil
Hagans, Betty
Hagans, Bruce
Hale, Janice E.
Hall, Antonia
Halla, R.C. & Janet
Hamilton, Barbena L.
Hackamack, Jean
Hamilton, David
Hamlin, Victoria
Hammer, Betty
Hobson, Gregorie R.
Hammer, Earl
Haner, Doug
Haney, Sherrie
Hansen, Jean E.
Hardbarger, David
Hathaway, Pete
Hardey, Elizabeth
Harding, Benjamin L.
Harding, Rick & Carol
Hardy, Mike
Harmon, Greg B.
Harms, Richard

Harper, Duane J.
Harper, George L.
Harper, L.R.
Harper, Robin
Hoberh, Pam
Hobson, Charles H.,III
Hodder, R. Frederich
Hodnett, Mr.&Mrs. Stan
Hoffman, Charles
Harmon, Diana
Harkin, Tom
Horgan, Dennis
Horrigan, Albert E.
Hartzell, Nick
Hroby, Jane
Hogan, Mike,Frank & Carol
Holbek, Lars
Holden, Dale D.
Holley, Chris
Holliday, Margaret
Hornberger, Nan
Huen, Louise
Husing, John
Holsen, Reese
Hale, W. S.
Hunter, Morris
Holton, Mrs. Lori
Hongell, George
Honig, Andrew & Sasha
Horgan, Dennis
Horn, Terry R.
Horst, Julie & Dan
Hougland, Roger
Holtel, Mike
Henze, Richard
Hilielski, Robert
Hobbs, L. H.
Heitz, Peggy
Harvest, Walt
Hack, Darrell
Hall, Bill
Howe, Alan T.
Horwitz, Clint
Hotchkiss, Henry W.
Hougen, Laura
Hough, Roger W.
Hougland, Lourie
Houk, Gary
Horner, Neil
Harvey, Lisa
Hunt, Murray C.

Henn, Robert L.
Henningsen, Phillip R.
Henry, Lin
Hickman, Robert B.
Hirshfield, Andrew
Hislop, Arthur A., Jr.
Hixsom, M. J.
Hoadley
Hoag, Thomas
Hernandez, Victor J.
Hershberg, Ann M.
Hertzler, Dick
Heuman, Sally
Hickel, Terri
Higgins, Katherine
Hoffman, Howard M.
Hoffman, Mark L.
Hoffman, Mike
Hoffman, Ron
Hoffman, William P., Jr.
Hillel, Allen
Hiller, Francis
Hills, Benjamin
Hinkleman, Barb
Hirsch, Barbara
Hirsh, Milton A., Jr.
Hollis, Robert W.
Holloway, Leland
Holmstrom, Mary D.
Holsey, Harlan
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Haldorsen, Tom
Hammer, Douglas L.
Hanna, Bill
Hansen, Pauline
Harper, Wade
Harrington, Thomas E.
Hein, Kirk
Hauck, Roanal

Hauser, Delvina
Havan, Stephen
Haack, Warren
Hall, Kevin
Handy, George & Elsie
Hansen, Kevin
Harmer, David
Harper, Joyce
Haughey, Vincent J.
Hulfgren, Kathleen
Heath, Roberta B.
Hedges, Pamela
Hegbee, Garry
Hendrickson, Doug
Hackamack, Pearl
Haddeland, George
Hagan, Gil
Hagans, Bruce
Hagans, BruceHal
Hale, Janice E.
Hall, Antonia
Halla, R.C. & Janet
Hamilton, Barbena L.
Hackamack, Jean
Hamilton, David
Hamlin, Victoria
Mammer, Betty
Hobson, Gregorie R.
Hammer, Earl
Haner, Doug
Haney, Sherrie
Hansen, Jean E.
Hardbarger, David
Hathaway, Pete
Hardey, Elizabeth
Harding, Benjamin L.
Harding, Rick & Carol
Hardy, Mike
Harmon, Greg B.
Harms, Richard
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Harper, George L.
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Harper, Robin
Hoberh, Pam
Hobson, Charles H.,III
Hodder, R. Frederich
Hodnett, Mr.&Mrs. Stan
Hoffman, Charles
Harmon, Diana

Harkin, Tom
Horgan, Dennis
Horrigan, Albert E.
Hartzell, Nick
Hroby, Jane
Hogan, Mike,Frank & Carol
Carol
Holbek, Lars
Holden, Dale D.
Holley, Chris
Holliday, Margaret
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Husing, John
Holsen, Reese
Hale, W. S.
Hunter, Morris
Holton, Mrs. Lori
Hongell, George
Honig, Andrew & Sasha'
Horgan, Dennis
Horn, Terry R.
Horst, Julie & Dan
Hougland, Roger
Holtel, Mike
Henze, Richard
Hilielski, Robert
Hobbs, L. H.
Heitz, Peggy
Harvest, Walt
Hack, Darrell
Hall, Bill
Howe, Alan T.
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Hougen, Laura
Hough, Roger W.
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Houk, Gary
Horner, Neil
Harvey, Lisa
Hunt, Murray C.
Hedge, Joe
Hulfgren, Kathleen
Howard, Dave
Huard, Charles J.
Hubbard, Franklin D.
Hemingway, Michael D.
Huish, Lois R.
Holly, Steve & Pamela

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Hurtergter, Thomas M.
Huser, Verne
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Hartman, Thomas L.
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Haupt, Edward Jr.
Ingeman, Lance L.
Iverson, Cass
Irving, Jim
Ives, Sarah
Illick, Jean
Ingalls, Robert
Irish, Doreen
Isaacson, Robert
Ingels, Biff
Ingraham, Roger
Irvine, Carl
Israle, Stu
Ilvesta, Amy D.
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Johnson, Vinson H.
Jones, Donald R.
Jones, Kathy
Jones, Mary M.
Johnson, Albert L.
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Jung, Dean H.
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Jacobs, John
Johnson, Harold T.
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Jones, Edward
Jensen, Marvin O
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Jacobs, Judith
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Jensen, Lawrence O.
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Jobson, Brian D.
Johnston, Brian H.
Jagnetti, David L.
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Janos, Rodger
Johnson, Ray
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Judd, Arthur K.
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Jagger, Patricia
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Kittel, Timothy
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Klemens, Merikay G.
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Kovac, Thomas W.
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Kraft, Stephen L.
Kramer, Randy
Kraus, Peggy D.
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Krissoff, William B.
Krehbiel, Lynn
Krummel, Ursula C.
Kosik, Jeffrey
Kleinschmit, Karl
Kartozian, William F.
Katz, Hertzel, MD
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Kaufmann, Paul D.,MD
Kaulum, Leslie
Kawler, Michael
Kay, Allen

Kearney, D.
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Keft, Peter H.
Kime, Tom
Kutescher, Dr & Mrs.
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Kvarme, Michael
Kellum, Susan
Kelsey, Harvey M.
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Kelhsteat, L.
Kleinschmitt, Regina
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Kelly, Wayne
Kenney, Leslie M.
Kerridge, Mark
Kerrigan, Robert
Kiang, Robert L.
Kelbourne, Charles W.
Korn, Ralph A.
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Kemp, Stephen
Kutta, Richard
Koteen, Charles D.
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Krips, Bob & Ruth
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Kelly, Raymond E.
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Kramer, Chris & Robert
Klavon, Kent
Keber, Stephen G.
Krummel, Ursula C.
Kane, David
Karst, Joyce M.
Kruska, Dennis
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Koutnik, Daryl
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Koch, Arthur & Heidi
Kovalik, Nada
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Kawano, Ray Y.
Kaempf, Kathi
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Kell, Tom B.
Katz, James
Kilner, Joseph R.
Kutzscher, Bernard M.
Kuppermann, Barry
Koklich, John & Mike
Koning, Woody
Keyser, Dale
Kleinheinr, John H.
Kovner, Gvion
Kloes, Duane
Kubley, Roberta
Kolski, John E.
Kotz, Karrin
Kropp, Jerry
Kaplan, Kenneth M.
Karelitz, Fonda E.
Karen, Ann Elizabeth
Karp, Irwin
Karst, Joyce M.
Kiesbay, Amy
Kovalik, Kyle
Kennon, Richard
King, Richard
Knopp, David
Kakik, James J.
Kvarme, Michael
Kurse, Karen
Krusha, Dennis
Karsant, Jim
Kuhlman, Bruce
Kuklenski, P.
Kyngys, Renta
Klopfenstein, Gary
King, Robert W.
Kronenberg, Hale
Kerry, Susan
Kosik, Jeffrey J.
King, Holman
King, Larry C.
Keating, J.W.
Kennon, Richard
Kerridge, Mark
Kipping, John L.
Lindren, Duane
Lawrence, Linda
Lowenstein, Marco
Lucero, Pedro
Luckter, Valaree
Lukas, David M.
Lagomarsino, Robert J.
Lester, W. P. , Jr.
Lynch, Carolyn
Lyon, Lucinda
Lee, Hawke N.
Leshy, John D.
Livingston, A.
Logan, Tom
Lobush, Diana
Leggett, Dennis
Lahmeter, Chuck
Loza, Ron
Latham, Thomas W.
Lawton, Timothy
Laden, William J.
Lengyel, J.
Lessing, Diane
LeCam, Steven
Laird, Andrew
Lamoreaux, Bret
Lang, Bill
Lawton, Rebecca
Lemmon, Marilyn
Lokan, Leah D.
Lockwood, Lorri
Linson, Gary T.
Lindquist, Mrs. E.
Lane, William M.
Ling, Lois
Lipp, Martin R.,MD
Landreth, Bill
Lisper, Kristina
Liston, Mr.&Mrs.T.
Little, James G.
Little, Sandra
Lucich, Kathy
Lukesh, Robert C,MD
Lockhart, Earlene
Logan, Tom
Lorinfosse, Natalie
Lokan, Kim
Lyon, Robert R.
Long, David L.
Long, Gail C.
Lopes, James
Lorimer, Dan
Lyon, Robert E.
Linnik, Sonia
Lounghridge, Lauren

Love, T.P.
Lovelace, Sandra
Lovelle, J. J.
Lovering, Hilde
Lovering, Tom
Lowrey, Mary C.
Lowry, Norma
Lucarelli, Dennis
Lanni, J. Terrance
Lougban, Joseph B.
Lasater, Ike
Larabell, Roy
Larsen, George
Levin, Jamie
Lorenzen, Mothra
Linford, Richard & Carol
Link, Meredith A.
Lieb, Arthur A.
Lynch, Doris
Linford, Richard
Lampliner, Fred B.
Lacey, JoAnn
Lachman, Mrs. John A.
Locke, Suzanne G.
LaFlamme, Donna
LaFollette, Douglas
Lague, Elizabeth
Lahr, Don Jr.
Lake, Reg
Langer, Jan
Lobree, Floyd
Lane, J. R.
Laney, Lyne
Lange, James E.
Landreth, William C.
Lang, Philip C.,MSW
Langton, Janet & Johanna
Lang, John A.
Larkin, Kenneth A.
Larson, Nancy
Loueridge, Lui
Lawton, Jennifer C.
Lautner, Mary B.
Lawrence, Clifford S.
Lawrence, Keith
Laws, Robert H.,Jr.
Lawton, Mary F.
Lawton, R. E.
Ledin, Lisa
Lilly, Susi
Lazaroff, Judith A.
Lazarus, Edna
Lazenby, Melba
Leachman, Greg & Wann
Leanred, Terry C.
Lederer, Nichole E.
Lee, Grace
Lee, Randal Perry
Lee, Rosemary
Lehman
Lazeres, Robert
Lemons, Mrs. Ross A
Leonard, Richard M.
Leonard, Robert L.
LeSire, Patricia & James
Lester, J. Morgan
Levenson, Eric
Lewin, Barbara
Lewis, Peter
Lewis, Richard & Carry
Levinson, Jay
Lewis, Joan
Lilly, David R.
Line, Meredith
Lee, Larry
LaBreton, D.C.
Leonard, Richard
Latourell, John A.
Macdonald, Katie
Marino, Lawrence,MD
Martin, Barry & Carolyn
Martin, Bruce & Irene
Martin, Charles F.
Maylum, Michael R.
Martinson, Linda
Martyn, Bonnie
Marz, Tom Alan
Marzell, Tina
Maryland, Gerald
Masino, Romero
Mastin, David R.
Matar, Janis
Mathesn, Meigs
Mattka, F. Jerry,DDS
Matson, Karen
Matthews, Edgar L.
Matuschek, Cecilia
May, Joanne Marie
Maurer, Nelson
Machek, Bill
Maurier, M.D.
Maxwell, L. E.
May, C. Germaine
May, Theresa A.
Mayes, G.
Mayland, Gerald
Maynard, Carol
Mazer, Elaine
Meakin, Percy
Meal, Tammy
Main, Shirley A.
Manam, Mard
Mantell, James
Marymee, Maureen
Magnesou, Sally
Murphy, Charlotte
Mihalik, Greg
Morales, Ralph
Morris, Michelle
Mitchell, Bill
Mears, Cindy
Mellem, Roger
Moss, Glen L.
Macomber, Kingsley
MacNeal, Sam
Madesen, Catharine
Madsen, Mr.&Mrs. S.
Myers, Michael B.
Magneson, John
Magneson, Nancy
Merlin, John
Miles, Ken
Miller, David A.
Males, Mrs. J.R.
Maller, James L.
Moore, Christina
Maline, Ms. Anne
Maloney, Ed
Maloney, Mrs. W. F.
Mandel, William
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Mt. Baker/Snoqualamie NF
Miller, R. D.
Miller, Mr.&Mrs. W. B.
Melone, Beverly
Melville, Robert S.
Melvin, Ann & Howard
Melvin, John T.
Melzer, Bruce
Merrell, Mr. & Mrs.
Mayer, Kathy
Mitchell, John H.

Mobilip, Richard L.
Miller, C. Richard
Miller, James
Miller, Katherine A.
Miller, James D.
Miller, Katherine L
Miller, L.
Miller, Marc
Miller, Norman G.,MD
Miller, Patricia D.
Mooney, Sandra & Dave
Moore, Bernice
Mills, Peter
Mills, Thomas C.
Milo, Nancy
Milton, Peggy A.
Mills, Steve
Miner, Jeff
Minor, David
Mitchell, Heidi
Morioka, Nancy
Morley, Mr.&Mrs. Arhtur
Morphis, Steve
Moeller, Mary Ann
Moffatt, Bruce
Monez, Wayne
Monkres, Reverend Peter
Montag, Craig
Montgomery, Richard
Morgulis, Melvin
Moyer, Harold R.
Munger, Maynard
Murphy, Ann
Moore, Mr.&Mrs. John
Moorehead, Lisa
Mooz, William E.
Morandn, Janet
Morehouse, Adrienne
Morgan, William J.
Morgenson, Randy
Minvielle, Al
Mueller, Renee
Martin, Edward R.
Murphy, Edward & Gretchen
Moros, Kirk
Morrow, R. W.
Morse, Sherry B.
Motley, Sarah
Mountain Affair
Mountaineering
Mountain, Ken
Munroe, Joe
Murray, Grace E.
Myers, Jim D.
Murphy, Joseph A.
Meeds, Lloyd
Moulter, Steffon
Moratto, Michael J. Ph.D.
Mueller, Christine
Mohler, Amy
Mueller, Laura
Moyer, Dennis
Milligan, Tom
Mever, Alice
Muesser, Charles A.,Jr.
Marks, Merciana
Murphy, Elizabeth
Mertins, Glenn
Michael, Gary
Moyer, Don
Moyer, Don II
Miller, Susie A.
Mason, Carole
Matarozzi, Daniel
Muller, Michael
Meadow, Lynne
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Mi-Wok Ranger Station
Masse, Richard R.
Mitchell, Thomas R.
Meyer, Mr.&Mrs. H.F.
Matsuura, Marsha S.
Masheic, Bill
Meral, Barbara
Marler, E. N.
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Manuel, Peter
Manuel, Susan
McGehee, Philip
Miller, Charles W.
Miller, Ted W.
Maida, Nino
Menny, Robert M.
Mason, Willis Jr.
Marshall, Laird E.
Mass, John DVM
Mills, John S.
Murphy, Christopher
Meyers, Granklin J.
Misfeldt, Jerry
Mueller-Crispin, Deanna E.
Miller, R. G.
Malley, Jeff
Madnesen, Robin
Moyer, Neil A.
Miller, Ray C.
Muellen, Michael
Miller, Eric
Meier, Danny
McIntosh, Ray
McAdams, Mary T.
McBride, Judy
McCain, Barbara
McCann, Laurie
McCann, V.B.
McCarthy, Jim
McCarthy, Joan
McClung, Boyce
McCluskey, Anita
McCluskey, Ruth
McCord, Jane
McCoy, Jenny
McCullough, Floyd
McCutcheon, Dyanne
McDerwott, T. E.
McDonald, Michael
McDonald, Sharon
McDonnell, Bob &
LaVerne
McDonnell, Martin S.
McEuen, Mark
McEwen, Martha
McFadden, Sandra K.
McGeein, Donald F.
McGinn, Phillip S.
McGinnis, William
McGrady, Michele
McHarper
McKinstry, Craig
McHugh, Teresa
McIntosh, Douglas
McKee, Josh & Katie
McKee, Richard G.
McKee, Thomas C.
McKenna, Elaine I.
McKenzie, Vern
McKinaly, Michael
McLaren, Marcia
McLaughlin, Kathy
McLean John &
Katherine
McKinny, Deane
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McFall, John, Congress-
man

McLean, Andy
McKenna, Mike
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McGehee, Philip E.
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Nohl, Mary
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Noteman, Jacquelyn
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Osgood, Jon
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Patna, Tom
Poll, Elizabeth
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Peterson, H.V.
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